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UNITED STATES DEPARTMENT OF AGRICULTURE

DEPARTMENT BULLETIN No. 1467

Washington, D. C. ▼ March, 1927

# COMMUNITY PRODUCTION OF ACALA COTTON IN THE COACHELLA VALLEY OF CALIFORNIA

By

H. G. McKEEVER
Junior Agronomist, Bureau of Plant Industry

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By H. G. McKeever, *Junior Agronomist, Office of Cotton, Rubber, and Other Tropical Plants, Bureau of Plant Industry*

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## INTRODUCTION

A one-variety cotton community has developed in the Coachella Valley of California as the result of a small planting of Acala cotton made in the valley in 1920. Community organizations were established at that time and have been continued since, so that the community has functioned for a series of years on a basis of one variety. It is believed that several features in the experience of this community in the utilization of one variety of cotton and in maintaining a supply of pure seed will be of special interest in other communities and of general interest to those who are concerned with the improvement of conditions of production in the cotton industry.

The object in mind has not been to enumerate the advantages of community cotton production, since this phase of the subject has been treated in other publications, some of which are listed at the end of this bulletin, but rather to describe the development of an actual one-variety community. As will be appreciated from the

experience here related, the problems of community development are in need of careful study from many different angles.

Since the production of pure seed bears important relations to the community production of one variety, the procedure of establishing and maintaining a seed supply also is described.

## LOCAL CONDITIONS

The Coachella Valley is situated in Riverside County in the southern part of California. It slopes toward the southeast between the San Jacinto and San Bernardino mountain ranges and extends from the San Gorgonio Pass to the Salton Sea. Desert conditions obtain in the valley and much of the area is below sea level, the summer months being very hot. The water for irrigation is not supplied from storage dams by gravity, as is the case in most of the larger irrigated districts of the Southwest, but is pumped from wells, each farm usually being equipped with its own well and pumping plant. Flowing wells formerly existed in the valley, but their number has diminished with the increase in the cultivated area, until now they exist only in the lower portion of the valley.

One of the first crops tried in the early days was muskmelons. They were grown with water from the flowing wells and were harvested during May and June. The melon aphis became a serious pest, however, and with the development of the Imperial Valley and the large melon plantings made there, the industry became unprofitable in the Coachella Valley. The rancher then turned his attention to other crops, including cotton. The other principal crops now being grown in the Coachella Valley are dates, grapefruit, grapes, onions, and early vegetables.

## FIRST COTTON PLANTINGS

The commercial history of cotton production in the valley dates from 1910, when a 2-stand gin was erected at Arabia, though small dooryard and test plantings had been made prior to that time. One of these small plantings was made at Coachella in 1908 by the United States Department of Agriculture, which has experimented with the production of cotton in the irrigated valleys of the Southwest since 1902. In 1909, O. F. Cook published a statement made by T. H. Kearney, of the department, regarding this planting, which was of an Egyptian variety.[1]

In 1909, A. W. McGill grew about 2 acres of Rowden cotton with seed procured in Texas and about one-quarter of an acre of Egyptian cotton with seed obtained from the United States Experiment Station at Yuma, Ariz. According to McGill the 2 acres of Rowden produced about 2 bales, but the Egyptian did not do very well. As there was no gin in the valley, McGill constructed a hand-roller gin, using a roller from a washing machine and a wooden roller. He ginned enough cotton to obtain seed for his next year's planting and stored the rest of his seed cotton.

The first commercial cotton plantings were being made in neighboring valleys at about the same time, the first in the Imperial

[1] Cook, O. F. Suppressed and intensified characters in cotton hybrids. U. S. Dept. Agr., Bur. Plant Indus. Bul. 147. 27 pp. 1909.

Valley being in 1909, and in 1910 five gins were put up there. This was the same year that the first gin was erected in the Coachella Valley. Commercial production of cotton did not begin in the Yuma Valley, however, until 1911, when about 30 acres were grown.

In the Coachella Valley considerable cotton enthusiasm developed as a result of the 1909 plantings, and a carload of Rowden seed was ordered from Texas for planting in 1910. Some Mebane seed was also brought in from Texas at this time. These seed importations were fumigated at Thermal, Calif. In July a 2-stand, 70-saw gin was erected at Arabia, and, though no definite figures regarding production are available, it is probable that several hundred or even a thousand bales were ginned.

Though the industry continued to develop very rapidly in the Imperial Valley, little cotton was grown in the Coachella Valley after the 1910 plantings, on account of the rather low price and local difficulties in marketing the 1910 crop.

From 1910 to 1914 scattered fields, probably to the extent of several hundred acres, of ratoon and planted cotton were grown in the Coachella Valley. In 1915 no cotton was planted in the valley, as a result of the low prices of 1914, although a few ratoon fields may have been harvested. During this period varieties of the Texas big-boll type were grown, and an attempt was made to grow Egyptian cotton about 1913. In ginning Egyptian cotton, however, a roller gin is necessary in order to prevent injury to the fibers. Since there was no roller gin in the Coachella Valley the Egyptian seed cotton had to be shipped to the Imperial Valley for ginning, which prevented this variety from getting much of a hold in the Coachella Valley.

## SECOND PERIOD OF COMMERCIAL PRODUCTION

With the rise in cotton prices in 1917 and 1918, interest in cotton was again aroused in the Coachella Valley, as in the other irrigated districts of the Southwest. In 1918, 124 bales were ginned at the Arabia gin, and in 1919 production increased to 624 bales. Rowden was not planted during this period but was replaced by Mebane, another variety of the Texas big-boll type.

In 1918 most of the cotton in the Coachella Valley consisted of the Mebane variety, although a little Durango, a long-staple upland variety introduced from Mexico and bred by the United States Department of Agriculture, was planted. Durango, however, became very popular in the valley in 1919 and 1920, as it did also in other parts of the Southwest, and the acreage planted to Durango in the Coachella Valley probably equaled or exceeded the Mebane acreage.

In 1920 the cotton acreage in the Coachella Valley was materially increased on account of the high prices prevailing at planting time. The 1920 production was 2,435 bales as compared with only 624 bales from the 1919 crop. During 1920 another attempt was made to grow Egyptian cotton in the valley, this time planting Pima, a new variety of Egyptian bred in Arizona by the United States Department of Agriculture. Only a few hundred acres of Pima were grown, and as in previous years the seed cotton had to be shipped to the Imperial Valley for ginning. Only a small percentage of

the Pima acreage gave satisfactory results, which fact, added to the ginning difficulties and the unsatisfactory price which later developed, resulted in these being the last Pima plantings made in the Coachella Valley.

During the summer of 1920 a new 4-stand gin was erected in the valley at the town of Coachella, and the old gin at Arabia was moved to Thermal. The company controlling the Arabia gin moved it, because they considered Thermal more centrally situated in regard to the cotton acreage in the valley.

## FIRST ACALA PLANTING IN THE COACHELLA VALLEY

The first Acala cotton grown in the Coachella Valley was planted in 1920 by the Department of Agriculture. Two small fields a few rods apart were planted March 27 at the United States Experiment Date Garden near Indio. The plantings were made to determine the general behavior and commercial possibilities of the Acala variety under the extreme conditions obtaining in the valley. A brief history of Acala and of the seed stock used in making this planting follows.

Acala is an upland variety developed from imported seed. The original stock was obtained in December, 1906, by G. N. Collins and C. B. Doyle, of the Department of Agriculture, at Acala, in the State of Chiapas, southern Mexico, as the result of an expedition sent out for this purpose, the existence of a native big-boll type of cotton in southern Mexico having been discovered during a previous expedition conducted by O. F. Cook. The preliminary work of acclimatizing and selecting desirable strains from the Acala stock was carried on chiefly in southern Texas between 1907 and 1911. After being placed on a field basis, Acala attracted very favorable attention in Oklahoma and Texas, and the acreage increased rapidly.

In 1917 several of the more promising upland varieties, including Acala and Pima Egyptian, were tested in the San Joaquin Valley of California by the Department of Agriculture. These tests indicated that both Acala and Pima were well adapted to the San Joaquin Valley conditions. At that time Pima was bringing a very good price, and this variety was recommended for general planting in the San Joaquin Valley.

In 1918 about 3,000 acres of cotton were grown in the San Joaquin Valley. This acreage consisted principally of Egyptian, though some upland cotton was grown. In 1919, however, the greater part of the San Joaquin Valley acreage was of the upland type. On account of the unsettled condition of the variety question and the desirability of obtaining a nucleus for future seed supply in case upland varieties should be planted exclusively, the Department of Agriculture, in February, 1919, sent 10 bushels of Acala seed grown in northern Texas to W. B. Camp, the department representative in the San Joaquin Valley.

Mr. Camp placed the seed with a cooperator in the Arvin-Weed Patch district, where it was well isolated, and a field of about 8 acres was grown. This field was rogued during the summer by

department representatives. It yielded about a bale to the acre, which gave about 4 tons of Acala seed. The field attracted favorable attention, and the grower sold the seed for 5 cents a pound, most of it going to neighboring ranchers for planting in 1920.

A part of the seed produced in 1919 by this 8-acre planting in the San Joaquin Valley was used in 1920 in making the first Acala planting in the Coachella Valley. This planting gave exceptionally good results. One of the two small fields at the date garden, containing 0.42 of an acre, had been in alfalfa, while the other, measuring 0.66 of an acre, was raw desert soil, except for a volunteer wheat stubble turned under. The alfalfa block, in spite of a poor stand, produced 1,360 pounds of seed cotton, and the new land gave 2,919 pounds, yields that are equivalent to 3,238 and 4,423 pounds per acre, respectively. The ginned cotton weighed 1,377 pounds, or at the rate of 2.07 bales of lint per acre for the alfalfa land and 2.83 bales for the new land.

## INTEREST AROUSED BY THE ACALA PLANTING

The remarkable showing made by the small Acala planting at the United States Experiment Date Garden in 1920 attracted a great deal of attention throughout the Coachella Valley and even in other districts of the Southwest (pls. 1, 2, and 3). Hundreds of visitors came to the date garden to see the Acala cotton fields, and newspaper reports placed the yields at 4, 5, and even 6 bales to the acre. Though there was no basis for such exaggerated reports, nevertheless the production of cotton at the rate of over 2½ bales to the acre was sufficiently rare to attract attention. In order to correct the erroneous reports, the department issued a press notice May 6, 1921, giving the actual results of the Coachella Valley planting and describing what could really be expected of the Acala variety.

The season of 1920 was unusually hot, the mean maximum temperature for July being 109.4° F. instead of the usual 102 or 103° F., and as a result of the heavy yields obtained under such extreme conditions the date garden received many requests from Coachella Valley cotton growers for the seed produced.

It was recognized also by some of the growers that the comparatively small area of the Coachella Valley and its complete isolation from other cotton-growing districts by many miles of desert and mountains would constitute decided advantages in the production of pure planting seed for shipment to other cotton regions.

Department representatives suggested that, if the production of planting seed was to be undertaken, it was essential for the Coachella Valley to become a single-variety cotton-growing community and that every effort should be directed to complete elimination of other varieties. Since cross-pollination in the field by insects is frequent and the seed is often mixed to the extent of 25 per cent with modern gin equipment, it was pointed out that only by the community limiting itself to the production of one variety of cotton could pure seed be produced in large quantities and with adequate assurance of maintaining the supply over a period of years.

## FORMATION OF THE ACALA COTTON GROWERS' ASSOCIATION OF THE COACHELLA VALLEY

In the fall of 1920 several of the Coachella Valley cotton growers who were interested in procuring the Acala seed produced at the date garden and in forming a one-variety community took steps for the organization of an Acala cotton-growers' association. By-laws and articles of incorporation were drawn up, and the Acala Cotton Growers' Association of the Coachella Valley was duly incorporated December 18, 1920, under the laws of the State of California relating to the formation of a nonprofit cooperative agricultural association.

The articles of incorporation state that the purpose of the association is "to engage in and carry on the business of supervising the growing, receiving, ginning, grading, storing, shipping, and marketing of Acala cotton and Acala cottonseed grown or controlled by its members * * *."

The by-laws provide for a board of five directors elected by ballot at the annual meeting of the members. The directors are elected to serve for two years, but at the first meeting three of the directors were elected to serve for only one year, so that thereafter new directors would be elected annually. Voting power is allotted to the members on the basis of one vote for every 5 tons of cottonseed handled through the association. The directors elect the officers of the association from their own number, the officers serving for one year.

Since the principal object of the association at the time of organization was the marketing of Acala planting seed, an agreement was drawn up between the association and its members dealing with the method of handling the seed produced. This agreement states that the association is made the agent of the several growers for a period of five years and is given the exclusive right to "market, sell, and dispose of all the cottonseed grown or handled by the several growers." Each of the growers agrees, "for the purpose of maintaining and safeguarding the varietal purity of the present stocks of Acala cottonseed, to plant only such cotton seed as shall be approved by the board of directors of the association for planting in the Coachella Valley." For the purpose of obtaining uniformity in handling, the board of directors of the association also has the power to "prescribe reasonable rules and regulations, regulating and controlling the methods and manner of picking, handling, hauling, ginning, and sacking the cottonseed of the said growers."

The agreement further stipulates that all cottonseed furnished by the association to any member for planting purposes is for his exclusive use, and the grower agrees not to sell or otherwise dispose of such seed. The board of directors is also given the authority to inspect the members' cotton at any time or stage in the growing, handling, or grading and to assign the seed of members to such pools or grades of seed as they may deem it desirable to establish, and in the event of any disagreement the decision of the board of directors is to be final and conclusive.

In regard to the distribution of proceeds, it is stipulated that all growers who have seed of like grade or classification shall receive the same return per pound.

## ACALA PLANTING INCREASED BY THE FORMATION OF THE ASSOCIATION

The organization of the association formed a nucleus of potential Acala cotton growers, and the next step was to procure a supply of Acala seed for the members. The association inquired at the United States Experiment Date Garden as to where a good supply of Acala seed could be obtained for planting in the Coachella Valley. They were referred to W. B. Camp, the department representative at Bakersfield, Calif., who recommended the same cooperator in the Arvin-Weed Patch district of the San Joaquin Valley that had grown the Acala field in 1919 as having the only good supply of Acala planting seed. This cooperator controlled much of the Acala seed produced by his neighbors in 1920, in addition to the seed produced on his own place.

The association purchased 7 tons of this seed for planting in the Coachella Valley in 1921 and offered it for sale to anyone in the valley at the first cost plus freight and handling charges, which amounted in all to 7 or 8 cents a pound. All of the seed, however, was not sold, about 3 tons being carried over until the next spring.

The owner of one of the gins in the valley also bought about 20 tons of Acala seed from the same source in the San Joaquin Valley.

## DISTRIBUTION OF ACALA SEED PRODUCED AT THE UNITED STATES EXPERIMENT DATE GARDEN IN 1920

The small fields of Acala cotton grown at the United States Experiment Date Garden in 1920 were rogued by representatives of the department and produced about 2½ tons of seed. The roguing process consists of removing off-type or "rogue" plants from the field. Small numbers of such plants will appear, even in well-bred stocks, and these are one of the causes of varieties running out. Sometimes they are widely divergent or degenerate plants, or they may exhibit only slight variations from the type. Some "rogue" plants can be recognized in the early stages of development by the branching habit or by leaf, internode, and boll characteristics.[2] The fields are usually rogued shortly after the first flowers appear, before there has been much opportunity for cross-pollination. Every plant in the field is examined by walking up and down the lanes between the rows.

In order that a supply of pure Acala seed might be available for general planting in the Coachella Valley in 1922, arrangements for increasing the date-garden seed stock during 1921 were made. The seed was placed with three growers who had clean land; that is, land not previously in cotton and sufficiently isolated from other cotton fields to reduce the chances of cross-pollination. These growers were also required to see that the cotton was ginned separately. They planted approximately 100 acres with the date-garden seed, and during the summer their fields were rogued by department representatives and others.

[2] Cook, O. F. Cotton selection on the farm by the characters of the stalks, leaves, and bolls. U. S. Dept. Agr., Bur. Plant Indus. Circ. 66, 23 pp. 1910.

Although the growers of the rogued seed had declared their intention of joining the Acala Cotton Growers' Association, they had a special arrangement with the association regarding the disposal of their seed. To promote the use of the rogued seed for planting within the Coachella Valley, these growers agreed to hold their seed, subject to purchase by association members or others for planting in the Coachella Valley, at the same price the association received for the best grade of planting seed sold outside of the valley. In the event of all their seed not being disposed of for planting in the Coachella Valley within a reasonable time, they were to sell outside of the valley at a price equal to or greater than that asked for association seed.

## DEVELOPMENT OF THE ACALA INDUSTRY IN 1921

### ACREAGE AND VARIETIES GROWN IN 1921

Though no definite figures in regard to acreage are available, there was undoubtedly much less cotton planted in the Coachella Valley in 1921 than in 1920, since only 781 bales were ginned from the 1921 crop, whereas 2,435 bales had been ginned from the 1920 crop.

The reduced acreage in 1921 was due to the rapidly declining cotton prices in the fall of 1920 and the low price at planting time. However, the efforts toward community production being made in the valley undoubtedly had some tendency to stabilize the acreage. Had it not been for the interest aroused in Acala as a superior cotton, likely to yield a profit even during periods of depression, and the movement to bring good seed into the valley, the acreage probably would have been further reduced.

Although the total cotton acreage was reduced in 1921, the Acala acreage increased from 1 acre in 1920 to approximately 300 acres in 1921, or about one-third of the total cotton acreage. The other two-thirds of the acreage were about equally divided between Durango and Mebane.

The Durango variety is similar to the Acala in plant type. It produces fiber of excellent length and quality, and very good yields are often obtained by skillful growers. The Durango bolls, however, are smaller than those of Acala and the lint percentage lower. Mebane, a variety of the Texas big-boll type, found its adherents chiefly among growers who had come to California from Texas. It has not proved very well adapted to the irrigated conditions of the Southwest, as it is rather determinate in growth and tends to lodge or fall down. The fiber is short and never commands the premium often realized for the Acala and Durango fiber. The Mebane fields in the Southwest also lack uniformity in regard to both plant and lint characters, since only a mixed seed supply is available. On account of the danger of introducing the boll weevil from Texas, the States of California and Arizona have regulations against the shipment of seed and maintain strict quarantines against seed from the eastern Cotton Belt.

The Acala acreage in the Coachella Valley was not concentrated in any one district, nor was the Durango or Mebane acreage. Consequently, where fields of different varieties were near each other,

FIRST PLANTING OF ACALA COTTON IN THE COACHELLA VALLEY, AT THE UNITED STATES EXPERIMENT DATE GARDEN, INDIO, CALIF., 1920

INDIVIDUAL ACALA COTTON PLANT AT THE UNITED STATES EXPERIMENT DATE GARDEN, INDIO, CALIF., 1920

A desirable type with medium long internodes

INDIVIDUAL ACALA COTTON PLANT AT THE UNITED STATES EXPERIMENT DATE GARDEN, INDIO, CALIF., 1920

Showing numerous large, well-opened bolls

more or less mixture was likely to occur, since an appreciable amount of cross-pollination is carried on by insects.

Still another agency of varietal mixture is present in the Southwest, when more than one kind of cotton is grown in the same community. On account of the mild winters the cotton roots and stalks frequently live through from one season to another, and ratoon plants grown from the old stumps of the year before are often present in the fields. Any seed cotton from the previous year's crop that has fallen on the ground constitutes another source of danger, since it is likely to germinate when the field is irrigated the next spring. When different varieties are grown in successive years, mixture from ratoon and volunteer plants of the year before would be very detrimental and would probably exceed the mixture caused by cross-pollination from neighboring fields.

With the cotton acreage about equally divided among three varieties, and Acala sometimes planted on land that had grown other varieties the year before, it was apparent that the Acala seed from the crop of 1921 would be of several degrees of purity.

### CLASSIFICATION OF ACALA SEED IN 1921

An account of the various degrees of mixture to which the different Acala fields had been exposed, it was decided to segregate the seed produced into several classes or grades. Grade 1 consisted of seed from the rogued date-garden seed increased by three special growers. Their fields had not been in cotton the previous year, were isolated from the fields of other varieties, and were rogued during the summer. This seed was to be used for planting in the Coachella Valley in 1922. The other grades of seed were all grown from unrogued seed purchased in the San Joaquin Valley and were to be offered for sale outside of the Coachella Valley. Grade 2 consisted of seed from clean fields; that is, fields not in cotton the previous year and isolated by a quarter of a mile from all other varieties. Grade 3 consisted of seed from fields that were clean but had not been isolated from other varieties. Grade 4 was seed from fields that were neither clean nor isolated.

The cooperation of the county horticultural commissioner was obtained, and the local horticultural inspector, H. G. Bloom, inspected the Acala fields during the summer for the purpose of determining to which grade seed produced by the various growers should be assigned. The horticultural inspector's decision was final in case of a difference of opinion.

### GINNING IN 1921

Since the public gin constitutes the greatest cause of seed mixture and consequent varietal deterioration, it was necessary for the association to protect its seed from mixture during the ginning process. Experiments have shown that more than 25 per cent mixture may result in seed of the first bale that follows a different kind of cotton, and that it will contain seed of the second, third, and fourth bales ahead if the seed is allowed to go through the screw conveyor.[3]

[3] Ballard, W. W., and Doyle, C. B. Cottonseed mixing increased by modern gin equipment. U. S. Dept. Agr. Circ. 205, 12 pp., illus. 1922.

In order to prevent mixture of seed at the gin, the rolls must be dumped and cleaned out and all seed cotton removed from the cleaner, beater, and overhead distributor. If the seed is not caught on the floor, the screw conveyor must also be cleaned out. These operations take considerable time and would hardly be practicable during rush periods.

A cleaning operation of this kind would be almost prohibitive if it was desired, as was the case in the Coachella Valley in 1921, to preserve all of the seed of one variety in a district about equally divided between three varieties, and if the cotton should be allowed to come to the gin indiscriminately, since it would then be necessary to clean the gin machinery many times a day.

As there were two gins in the valley and the association controlled only about a third of the acreage, it was hardly practicable to make arrangements at both gins for taking proper care of the Acala cotton seed. Negotiations were therefore opened with the gins to see which would provide the best and most economical arrangement for taking proper care of the association's seed.

The regular charge for ginning at that time was 35 cents a hundred pounds of seed cotton. One ginner asked 50 cents a hundredweight for ginning association cotton because of the time and trouble required to prevent mixture of seed and because of the loss of the customary profit from reselling the customers' seed to the oil mills. The other ginner offered to take any desired precautions to prevent mixing seed and to charge only the regular price of 35 cents a hundredweight for ginning, provided the association agreed to send all its cotton to that gin. The association accepted the latter as the more advantageous arrangement, and as its agreement with the growers permitted it to make any regulations governing ginning that were deemed necessary, it instructed its members to take all their cotton to the gin agreeing to care properly for the seed at the regular ginning price.

This gin installed an additional seed auger through which only Acala seed was to be run, thereby avoiding the labor and congestion in the gin building occasioned by catching seed on the floor. Separate days were set aside for ginning Acala cotton and the gin was thoroughly cleaned out before each "Acala day." The horticultural inspector was stationed at the gin during the cleaning process to see that it was done thoroughly.

A total of 781 bales was ginned from the 1921 crop, 219 bales of which were Acala, 216 Durango, and 292 "short" cotton grown from mixed Mebane seed. In addition, about 20 bales of Pima, which had to be shipped to the Imperial Valley for ginning, were produced from a ratooned field.

Not quite all of the Acala cotton grown in the Coachella Valley during 1921 was controlled by the association. The owner of one of the gins had also purchased seed from the San Joaquin Valley. This seed he put out with local growers, bought the increased seed back at a premium over oil-mill prices, and offered it for sale in other districts for planting purposes.

### SALE OF ASSOCIATION SEED, CROP OF 1921

The association had seed of three grades or degrees of purity from the 1921 crop which it offered for sale outside of the Coachella Valley: (1) Seed grown on clean land and isolated from other varieties, (2) seed grown on clean land but not isolated, and (3) seed from fields that were neither clean nor isolated. A price of $200 a ton or 10 cents a pound was set for the best seed and lower prices for the seed that had been subject to mixture in the field, since all of the seed had been protected from mixture at the gin. The price of 10 cents a pound, established for the best seed to be sold outside of the valley, automatically determined the price of the rogued seed which was to be sold in the valley at the same figure.

The results of handling more than one grade of seed, however, are likely to prove rather unfortunate, as in this instance: Many of the southwestern cotton growers had heard of the good results obtained with the Acala variety and wished to buy seed but preferred buying cheaper grades rather than paying the additional price asked for the best Acala seed. The result was that the poorer seed was disposed of first, at about $75 a ton f. o. b. Coachella, and very little of the best seed was sold. Later it became necessary to reduce the price of the better seed before it could be disposed of. Had the demand for Acala planting seed not been great enough to utilize the entire stock, such a procedure would have resulted in only the poorer seed being planted, while the better seed would have remained in a warehouse, unutilized, or would have been sold to the oil mill.

Through the cooperation of the county horticultural commissioner the association's seed was certified by the local horticultural inspector, who had examined the fields and supervised the ginning.

From the crop of 1921 the association sold 44 tons of seed for 1922 planting in other districts, which at 20 pounds to the acre would plant 4,400 acres. The association returned to the growers about $81.25 a ton. Most of the seed went to the Imperial and Palo Verde Valleys in California and a little to Arizona. The data regarding the sale of association seed from the crop of 1921 are given in Table 4 (p. 41) in comparison with similar data for later years.

### BREEDING WORK IN 1921

The seed that was being increased to meet the rapidly expanding demand for Acala was the best obtainable in the Southwest, but it did not represent the best possible development of the Acala variety and was not sufficiently uniform. The original seed sent to California was already several years from a breeding block. The 8-acre planting made with this seed in the San Joaquin Valley in 1919 was rogued, but roguing can not be expected to prevent deterioration unless precautions are taken against cross-pollination and mixing at the gin. None of the 1920 Acala plantings in the San Joaquin Valley were rogued; hence the Acala seed purchased for general planting in the Coachella Valley in 1921 was one year removed from rogued seed.

In the Coachella Valley a 1-acre field was planted in 1920 with seed produced by the rogued San Joaquin Valley planting of 1919. This acre was also rogued and furnished seed for 90 acres planted in

the Coachella Valley in 1921. The 90 acres were rogued in turn and produced a supply of bulk seed which had been rogued for three successive years. This supply of seed was large enough to plant the entire Coachella Valley in 1922. A diagram showing the above-mentioned plantings and illustrating graphically the history of the seed stocks is shown as Figure 1.

In 1921 another small Acala planting was made at the United States Experiment Date Garden, and one of the small fields of the year before was carried through the winter. Rogued seed of the Government date-garden crop of 1920 was used in making the planting. Seed of five increase progenies, sent from Clarksville, Tex., where breeding work with Acala cotton had been carried on for a number of years by the Department of Agriculture, were included in the planting.

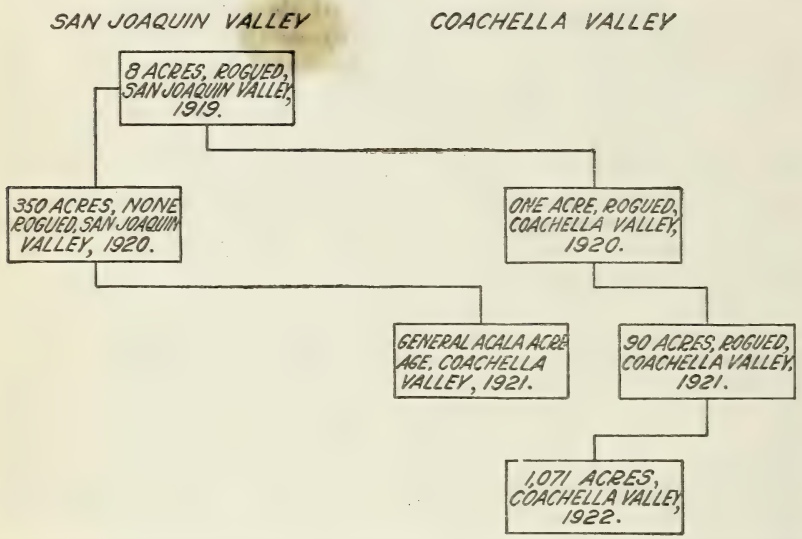
SAN JOAQUIN VALLEY
COACHELLA VALLEY
8 ACRES, ROGUED, SAN JOAQUIN VALLEY, 1919.
350 ACRES, NONE ROGUED, SAN JOAQUIN VALLEY, 1920.
ONE ACRE, ROGUED, COACHELLA VALLEY, 1920.
GENERAL ACALA ACREAGE, COACHELLA VALLEY, 1921.
90 ACRES, ROGUED, COACHELLA VALLEY, 1921.
1,071 ACRES, COACHELLA VALLEY, 1922.

FIG. 1.—Diagram showing history of the Acala seed used in the Coachella Valley, 1920 to 1922, inclusive

Seed produced by the first year's increase from a single plant is termed an "increase progeny," and these plantings constituted the beginning of an effort to improve the Acala seed stock of the Southwest. There was enough seed of each of the five increase progenies to plant one row about 200 feet long. In the fall individual plant selections were made from these five rows and also from the bulk field.

## DEVELOPMENT OF THE ACALA INDUSTRY IN 1922

### DISTRIBUTION OF ROGUED SEED FOR PLANTING IN 1922

In order that the Coachella Valley might become a one-variety Acala community, it was hoped that all of the cotton growers would plant only seed produced by the 90 acres of Acala rogued in 1921. This seed was owned by three special growers and was offered to all

Coachella Valley growers for planting in 1922 at 10 cents a pound, which was the same price asked for the best association seed sold outside of the valley. The seed was too high priced, however, for this object to be realized, since in any community there is always a certain number of growers who are not willing to pay a high price for planting seed. The price asked for the rogued Acala seed thus restricted its use and resulted in its being planted principally by association members and on only about 64 per cent of the 1922 cotton acreage. However, 85 per cent of the Coachella Valley cotton acreage consisted of Acala, the remaining acreage being planted with unrogued seed furnished by a local gin owner.

Very little of the association's first-grade seed for sale outside of the valley was actually sold at 10 cents a pound, since the price had to be lowered in order to dispose of it. Thus in reality the rogued Acala seed was sold in the valley at a higher price than the first-grade unrogued seed brought outside of the valley.

As a result of this policy about 16 tons of rogued Acala seed remained on hand, unutilized, up to the 1st of April. The association then made an effort to sell it outside of the valley at 10 cents a pound, but the price was too high for it to be disposed of, and the agreement with the growers did not permit lowering the price. The control of the seed then reverted to the owners, and they succeeded in selling all of it outside of the valley at prices ranging from 5 to 6½ cents a pound. Had this been the price set for the rogued seed in the first place undoubtedly more of it would have been used in the valley.

In June, after the onion crop had been harvested, many Coachella Valley ranchers decided to plant cotton following their onions. But by this time the only source of Acala seed was the unrogued seed handled by a local gin owner. Some of the onion growers planted the unrogued Acala seed, but one or two who would have planted Acala had rogued seed been available decided to plant Durango.

A plan that undoubtedly would have resulted in a wider local use of the rogued seed would have been to make it available to all valley growers at oil-mill prices plus the cost of sacking and handling. On this basis even the grower who usually saves his own planting seed at the gin would not be out much more than the cost of the sacks if he sold his own seed to the oil mill and bought rogued Acala seed. Under this arrangement it is likely that more of the growers of other varieties would have planted Acala, thus hastening the accomplishment of the one-variety objective, and more of the Acala growers would have been supplied with the best Acala seed. The fact that rogued Acala seed was sold outside of the valley and thereby largely wasted, while 46 per cent of the cotton acreage of the Coachella Valley where an attempt was being made to form a one-variety Acala community was not planted to rogued Acala seed, indicated that something was wrong with the method of procedure.

In the association's effort toward the production of pure Acala planting seed it would have been very much to the association's advantage for every grower in the valley, whether an association member or not, to have planted the rogued Acala seed. In a mixed

community, fields of another variety might be adjacent to an association member's Acala field, thereby disqualifying the Acala seed for planting purposes, reducing the association's production, and increasing the overhead expense. Also a wider use of the rogued Acala seed would have led to a greater improvement in the general quality of the valley cotton crop.

The distribution of the rogued Acala seed in the Coachella Valley in 1922 showed conclusively that asking a high price for the local planting seed, though it may increase the current year's returns, may retard materially the attainment of a one-variety community.

### ACREAGE AND VARIETIES GROWN IN 1922

There were 1,259 acres of cotton planted in the Coachella Valley in 1922, an increase of about 28 per cent over the 1921 acreage. The acreage planted to the Acala variety, however, increased from approximately 300 acres in 1921 to 1,071 acres in 1922, an increase of 257 per cent. The Mebane acreage decreased from approximately 300 acres in 1921 to only 17 acres in 1922. The Durango variety, however, did not give way to Acala so rapidly, the decrease being from approximately 300 acres in 1921 to 171 acres in 1922. Acala constituted 85.1 per cent of the valley cotton acreage of 1922, Durango 13.6 per cent, and Mebane 1.3 per cent. The above data are also given in Table 1 (p. 40) in comparison with the same data for other years.

Durango had been very satisfactory in many respects, and growers who had done well with it were reluctant to abandon it. The final decline in the Durango acreage in California was due more to the lack of a satisfactory seed supply than to any other factor. Private individuals and companies were in the Durango seed business for a few seasons, and their seed in some instances was held at high prices, but it proved unsatisfactory in uniformity, so that the farmers stopped buying it. Had there been an organized and successful Durango community so that the seed could have been protected from mixture, and the necessity for relying on the more or less sporadic efforts of private individuals for a seed supply thus avoided, good seed of this variety in all probability would still be available and would be planted to a considerable extent.

### CLASSIFICATION OF ACALA SEED IN 1922

The efforts of the Acala Cotton Growers' Association of the Coachella Valley toward the establishment of a one-variety Acala community and the natural advantages of the Coachella Valley for the community production of commercial quantities of pure seed enabled the association to obtain the cooperation of the Department of Agriculture from the inception of the Acala industry in the valley. The rapidly expanding demand for Acala seed and the importance of a supply of good planting seed in establishing the cotton industry on a better and more permanent basis in the Southwest made it important that this cooperation be continued and even extended.

From its experience in 1921 the association realized the disadvantages of selling more than one grade of seed, and in 1922 it

agreed to save only the best Acala seed for planting purposes. This grade consisted of seed from fields planted with Government rogued seed, grown on clean land, and isolated from fields of other varieties. The cotton from these fields was required to be ginned under conditions prescribed by the association to avoid mixing the seed at the gin. These were the same conditions prescribed for the first-grade seed in 1921, with the additional requirement that rogued seed be used in planting, since enough rogued seed to plant the valley had not been available in 1921.

A new county horticultural commissioner, who came into office in 1922, did not feel that he had authority to cooperate with the association in field inspection and to certify to the Acala seed, as had been done in 1921. However, a record of the quantity and kind of seed planted by each grower had been kept by the association, and since the services of the horticultural inspector were no longer available, the fields were visited and classified by the secretary of the association and a representative of the Department of Agriculture.

It was found that the association had furnished rogued Acala seed for 802 acres in 1922, but only 577 acres, or 72 per cent of the acreage, could qualify as producing good Acala planting seed. Twenty per cent of the acreage was land previously in other varieties, and 8 per cent of the fields were too close to fields of other varieties. Only the product of fields planted with rogued Acala seed, grown on land previously planted to Acala or not in cotton, and isolated from fields of other varieties, was designated as "planting seed," all other seed being designated "oil mill." On this basis, seed from only 45.8 per cent of the entire cotton acreage of the valley could qualify for planting purposes.

Classifying the 269 acres of Acala planted with unrogued seed on the same basis as the association Acala, it is found that though 1,071 acres, or 85.1 per cent, of the 1922 acreage consisted of Acala, only 69.8 per cent of this acreage consisted of first-grade Acala—grown on clean land and isolated by one-quarter of a mile from other varieties—while 18.7 per cent was grown on land that was not clean, and 11.5 per cent on land not well isolated. These figures are also given in Table 2 (p. 41) in comparison with similar data for other years.

### GINNING IN 1922

Since 85.1 per cent of the 1922 acreage and 850 of the 990 bales ginned consisted of Acala, it was not practicable to handle the Acala seed in the same way as in 1921, when all of the association Acala was ginned at one gin and "Acala days" set aside. The association controlled a good share of the acreage, and this arrangement in 1922 would have given one of the gins a very decided advantage over the other as a result of the Acala activity. It seemed desirable to avoid this complication if possible, lest the competition between varieties should become identified with the competition between gins, since the full cooperation of both gins in the district was necessary if the planting of one variety was to include the entire community.

In order to keep the Acala seed which had been grown under satisfactory conditions from being mixed when it reached the gin, it was of course necessary to clean the gin machinery whenever a

bale of Acala followed a bale of another variety. In addition to this obvious source of mixture, Acala from fields that had grown other varieties in previous years might contain cotton from ratoon or volunteer plants of the other variety, and where Acala fields were near fields of other varieties some mixture would have occurred through cross-pollination. Though the danger at the gin from this source is much less than from the ginning of cotton of another variety, it is nevertheless a tangible source of mixture. Consequently, the gin machinery was thoroughly cleaned whenever a bale of Acala from which the seed was to be saved for planting purposes followed a bale of Acala from which the seed could not be saved.

Only 59.4 per cent of the valley cotton acreage consisted of Acala planted on clean isolated land so that the seed could be saved for planting purposes. Thus, seed from 40.6 per cent of the acreage was to go to the oil mill, though only 14.9 per cent of the acreage consisted of varieties other than Acala.

The grower usually finds it necessary to gin promptly after a load of seed cotton has been picked, as he is likely to need his wagons to continue the picking operation. For this reason it was not practicable to set aside special days for ginning varieties other than Acala. The other varieties constituted such a small part of the acreage that in order to devote a full day's ginning to them the days would have had to be too far apart for the grower to hold over his cotton.

Since it was also necessary to clean the gin machinery between bales of Acala, when seed to be saved for planting purposes followed seed to go to the oil mill, it was decided that there would be less time lost if the cotton were allowed to come to the gin indiscriminately, and the gin machinery were thoroughly cleaned whenever a bale of Acala from which the seed was to be saved for planting purposes followed a bale that was not of the same character.

There were only two gins in the valley, and as the association was able to make the same arrangements for taking care of the seed at both of them it allowed its members to take their cotton to either gin. Both gins agreed to do the ginning at the regular price. One of them, a two-story plant, had not previously handled association ginning, and in order to keep the association seed separate the bottom on the seed auger was hinged so that it could be quickly and thoroughly cleaned. Bins for receiving the association Acala seed were provided at both gins.

The gins were furnished with a list of all the valley cotton growers, designating the variety, acreage, and disposition of the seed. Seed from the Acala bales was designated as either oil-mill or planting seed. The gins agreed to clean thoroughly the cleaner, feeder, roll box, screw conveyor, and any other part where seed might lodge, whenever a bale designated as Acala planting seed followed a bale not so designated. Since the cotton frequently reached the gin in groups of like seed, it was not necessary to clean the gin machinery as often as might be supposed.

A total of 990 bales was ginned from the 1922 crop, 850 bales of which were Acala, 130 Durango, and only 10 Mebane. The figures for 1921 were 219 bales of Acala, 216 Durango, and 292 Mebane,

showing that considerable progress toward the establishment of a one-variety community was made during 1922.

Although the acreage devoted to Mebane was quite small, the yield per acre of the three varieties grown in the valley during 1922 is perhaps not without significance. The Acala produced 0.79 of a bale per acre on 1,071 acres, Durango 0.76 of a bale per acre on 171 acres, and Mebane 0.58 of a bale per acre on 17 acres. Most of the Durango was grown on very good soil and well cared for, so the Durango yield may have been somewhat higher than it would be under average conditions. Since 85.1 per cent of the valley acreage was devoted to Acala, this yield undoubtedly represents average conditions. The number of acres and yield per acre of Acala is given in Table 3 (p. 41) in comparison with similar data for other years.

### SALE OF ASSOCIATION SEED, CROP OF 1922

From the crop of 1922 the association saved only the seed produced in fields planted with rogued Acala seed and grown on clean, isolated land. All seed of association members that did not meet these requirements was sold to the oil mill as ginned.

In the fall a partnership of two individuals undertook to purchase the association's entire production of Acala planting seed. One of the partners had had experience in selling cottonseed, and since the demand for Acala seed was very active they felt that they could pay the association a price that would allow it to return to its members a substantial premium over oil-mill prices and still make a profit for themselves.

After some discussion a purchase agreement was drawn between the association and these men. Under the terms of this agreement the association was to receive $120 a ton for the seed and was to furnish sacks stenciled with its brand. The buyers were to take the seed as fast as ginned and store it at their own expense. They were to sell only in the association's name and were to bear all the expenses of selling. No limit was set for the selling price of the seed, and the firm's profit would consist of what they could get for the seed above $120 a ton due the association and their expense in storing and selling it. Essentially, this was a plan whereby the firm was to act as selling agent for the association and would receive as commission all profits above the amount paid the association for the seed plus the cost of selling.

Although the association was to receive a good price for the seed, several disadvantages of the new selling plan were soon recognized. In case there should be a strong demand for the seed, the firm would make a handsome profit with practically no effort. Since the seed had been produced through community cooperation, such an outcome would be a cause for dissatisfaction among the growers. Some of the growers at least would be likely to feel that part of the profits resulting from their efforts in the association had been turned over to individuals without commensurate return. On the other hand, should the buyers be inefficient and the seed not readily disposed of, the growers would be likely to have the seed back on their hands at a time too late for them to dispose of it. This contingency,

besides causing a loss to the growers, would result in good seed which should have been planted not being utilized because inefficient individuals controlled it.

Thus it became more clearly recognized that when the entire community is organized into an association for the production of pure planting seed on a one-variety basis, it is better for the organization to handle the seed through its own representatives than to allow it to be exploited by individuals. Even though the judgment of their own officers is not likely to be infallible, the managers are elected by the growers themselves and are much more likely to work to the advantage of the community than are those who seek only to profit individually by the community's efforts.

As a matter of fact difficulties were soon encountered. The buyers did not undertake an active selling campaign as expected, but soon disagreed between themselves, and as the association was beginning to realize some of the unsatisfactory features of such an arrangement the contract was finally annulled with the consent of both parties. Fortunately, these difficulties arose before the contract had been in force very long, so that the association did not suffer materially from having made such an agreement.

After the contract was annulled the association had the seed cleaned and put up in 100-pound sacks stenciled with its brand. The cleaning process consisted of running the seed through a revolving wire-mesh cylinder which was divided into mesh of different sizes and took out most of the small, faulty seeds, dirt, and trash.

The association sold 256 tons of Coachella Valley Acala seed for 1923 planting in other districts. This was the total 1922 production, and at 20 pounds to the acre this quantity of seed would plant 25,600 acres. Most of the seed went to Arizona, though some of it was sold in the Imperial and Palo Verde Valleys of California. The wholesale price was $160 a ton delivered, and the association returned to the growers $84.03 a ton. Table 4 (p. 41) shows these figures in comparison with similar data for other years.

### BREEDING WORK IN 1922

There was available to the Coachella Valley for planting in 1922 a stock of Acala seed which had been rogued for three successive years. This seed was not used in planting the entire Acala acreage largely because of the high price at which it was held. However, the fact that it was used in planting all fields from which the Acala Cotton Growers' Association of the Coachella Valley saved seed constituted a considerable improvement over 1921, when none of the fields from which seed was sold outside of the valley had been planted with rogued seed.

Fields were rogued to furnish the Coachella Valley with Acala planting seed for 1923, but it was decided to make this seed available to the growers on a different basis from that of 1922.

The fields for roguing in 1922 were planted with seed produced by the 1-acre breeding block grown at the United States Experiment Date Garden in 1921. The breeding block produced enough seed to plant 46 acres, and as a measure of safety it was not concentrated with one grower, but divided among several. This is a

particularly desirable precaution in irrigated districts, where something might happen to the water supply.

During the summer these fields were rogued carefully by department representatives and produced 47 bales, an average yield of slightly more than a bale to the acre. From each 500-pound bale of lint ginned there is approximately 1,000 pounds of seed, so these fields produced about 24 tons of seed which represented four successive years of roguing. Since only 1,259 acres of cotton were grown in the valley during 1922 and the 46 acres rogued produced enough seed to plant 2,400 acres, it was thought that the supply of rogued seed would be ample to plant the 1923 acreage, even though an increase was expected.

The production of more rogued seed than is needed in the community is not worth while or desirable. For the roguing operation to be effective the work must be done by those who are familiar with the variety and type and skillful in detecting slight differences among the plants. Unless the seed is to be planted in a one-variety community, any effect of roguing will be lost in the next season, since the stocks are likely to be exposed to cross-pollination in the field and to mixture at the gin, unless special precautions are taken.

In ginning cotton from the rogued fields, precautions were taken to prevent mixing the seed with that from other fields of Acala. Before the rogued cotton was ginned the machinery was thoroughly cleaned, and when several bales had been picked arrangements were made to get them to the gin together. The rogued cotton was usually ginned early in the morning in order to avoid holding up the regular ginning during the cleaning process, which takes two hours or more. The seed was caught on the floor in front of the gin stands, sacked as ginned, and hauled to safe storage.

The effort to improve the Acala seed stock, started in 1921 by the importation of five increase progenies from Texas, was continued in 1922. A small breeding block of about seven-eighths of an acre was planted on the United States Experiment Date Garden. This block consisted only of seed produced in 1921 by the best one of the increase progenies (P–12–19–1–3) brought from Texas. Ten individual plants had been selected from this row, and seed from each of these plants was planted in a row by itself. Such rows are referred to as progeny rows. Seed from the other plants in the row were picked together and used in planting the rest of the 1922 block.

This block was carefully rogued during the growing season. Additional individual plants, or progenies, were selected in the fall, and the best one of the progeny rows was picked by itself. When seed from a progeny row is saved by itself it is referred to as an increase progeny. These progenies and the increase progeny saved were the best and most typical plants of the 1922 breeding block and were to be used for planting the 1923 breeding block.

The cotton from the rest of the 1922 block was picked together, and the seed was to be used in planting the fields for roguing in 1923, which fields were to furnish seed for planting the entire Coachella Valley in 1924. Cotton from the breeding block was, of course, ginned only after the gin machinery had been thoroughly cleaned. The seed was caught on the floor in front of the gin stands,

sacked as ginned, and hauled back to the United States Experiment Date Garden for safe storage.

These selections and increase progenies proved to be superior to the original stock of seed, being very much more uniform in plant characters and having larger bolls and longer and more uniform fiber. It was planned to substitute this improved stock for the original stock of seed as soon as possible.

Seed from one of the increase progenies sent from Texas (Oklahoma 8–1–1–1–3)[4], which had been grown at Indio in 1921, was sent to the United States Cotton Field Station in the San Joaquin Valley to form a nucleus for an improved Acala seed supply for that district.

## DEVELOPMENT OF THE ACALA INDUSTRY IN 1923

### DISTRIBUTION OF ROGUED SEED FOR PLANTING IN 1923

Since the high price asked for the rogued seed in 1922 had seemed to restrict its use and to retard the development of a one-variety community, a different plan was adopted for distributing the rogued seed in 1923. Had the old plan been continued, it is likely that the percentage of Acala cotton in the valley would have been reduced.

Under the new system the rogued Acala seed was made available to all bona fide Coachella Valley growers at cost; that is, the oil-mill valuation plus the cost of handling. Since the Acala seed grown by association members was sold outside of the valley and returned a profit above oil-mill prices, the growers of rogued seed evidently would be at a disadvantage. The association, however, was primarily interested in getting the entire valley on a one-variety basis, so it agreed to assume the distribution and sale of the rogued seed at cost. The farmers who grew the rogued seed joined the association, and though their seed was sold locally at cost, they received their pro-rata share of the returns from the seed sold outside of the valley. In other words, the money received from the sale of the rogued seed at cost and the greater returns from the seed sold outside of the valley were lumped together, and an equal amount per ton of seed was returned to each grower, so that all of the association members bore the burden of selling the rogued seed at cost in the local community.

The rogued seed was made available to any Coachella Valley grower, whether an association member or not, so that the entire community was able to obtain the highest grade seed at a nominal cost. One or two growers who obtained rogued Acala seed from the association at cost offered their seed for sale outside of the valley in competition with the association. The association recognized, however, that the advantages secured to the community by selling the rogued seed at cost far outweighed the disadvantage to the association of furnishing competitors with seed at cost. When rogued seed is available at cost, more of the local growers will use it, and since the association had agreed to sell only seed from fields planted with rogued seed, this would mean that more growers would

[4] Oklahoma 8, the original selection from which this stock was developed, was one of the selections from a small block grown in Oklahoma. A large Acala acreage developed in Oklahoma from other selections made from this block.

have seed eligible to be handled by the association. A wider local use of the rogued Acala seed would also hasten the complete elimination of other varieties and reduce the chances of cross-pollination in the field and of mixture at the gin. These results would also aid in selling the association's Acala seed, since it is now widely recognized that only under one-variety conditions can large supplies of pure seed be produced.

That selling the rogued seed at cost did secure these advantages is apparent when the amount of rogued seed planted in 1923 is compared with the quantity planted in 1922. In 1922 only 1,259 acres of cotton were grown, and rogued Acala seed was used in planting only 64 per cent of this acreage, whereas in 1923, when the rogued Acala seed was made available at cost, it was used in planting practically 96.6 per cent of the 3,641 acres grown. The other 3.4 per cent of the valley cotton acreage was devoted to other varieties.

The Coachella Valley cotton acreage in 1923 was three times that of 1922, and on account of this unexpectedly large increase there was a shortage of rogued seed for planting in 1923. The growers, however, restricted the number of pounds planted per acre, and by this method the rogued seed was spread over the entire Acala acreage. Where the grower could not pay for the rogued seed at planting time, he was allowed credit. This system of distributing the local planting seed led to the maximum use of the rogued Acala seed, which improved the quality of the lint produced in the valley in addition to making a larger quantity of good Acala seed available to other districts.

The problem of saving an adequate supply of rogued Acala seed for local planting was not without difficulties. When the seed is caught on the gin floor it has to be shoveled into sacks, the sacks must be paid for, the seed must be stored in a safe place over a period of several months, it must be insured, some one must be on hand to distribute it at planting time, books must be kept, etc.

The average oil-mill valuation of cotton seed at the gin over a period of several years is about $30 a ton. Adding to this figure the cost of handling made it necessary to sell the rogued Acala seed in the valley at $60 a ton or 3 cents a pound. The itemized cost of handling and saving the rogued seed is shown in Table 6 (p. 42).

### ACREAGE AND VARIETIES GROWN IN 1923

On account of the high prices of cotton the total acreage of the Coachella Valley was increased from 1,259 acres in 1922 to 3,641 acres in 1923, an increase of 189 per cent. The Acala acreage was increased from 1,071 acres in 1922 to 3,519 acres in 1923, an increase of 228 per cent. That the other varieties did not gain a greater hold with many new growers during this period of expansion is no doubt largely due to the fact that the rogued Acala seed was made available to all valley growers at cost.

Acala constituted 96.6 per cent of the 3,641 acres of cotton grown in 1923, Durango 2.6 per cent, and Mebane 0.8 per cent. The Durango acreage was reduced from 171 acres in 1922 to 95 acres in 1923. Sixty-two acres of Durango were ratooned in 1923, and

had this acreage been replanted it likely would have gone into Acala. The Mebane acreage, however, was increased in 1923, but not in so great a proportion as the Acala acreage. Seventeen acres of Mebane, constituting 1.3 per cent of the valley acreage, were grown in 1922, while 27 acres of Mebane were grown in 1923, but constituted only 0.8 per cent of the valley acreage. The 1923 acreage data are given in Table 2 in comparison with similar data for other years.

The Coachella Valley community had now reached the point where 96.6 per cent of the cotton acreage consisted of one variety, varieties other than Acala being almost completely eliminated. But completely eliminating all but one variety of cotton in a community is a much more difficult problem than getting nearly all of the growers to plant one variety. The majority of the growers in a community can readily see the advantages of growing one variety, but these advantages are not so readily discernible to a small proportion of the population, and the more they are urged to give up the variety they happen to be growing the more determined they become to continue with it. Such growers are frequently renters who have no community interest, and sometimes they are influenced by personal animosity toward the leaders of the community. Occasionally some one is found who might maliciously plant another variety in a one-variety district. Usually, however, these reactionary growers simply fail to see that the advantages of having one kind of cotton in the community far outweigh, for themselves and their neighbors, any advantage that they possibly can get from growing different varieties.

### CLASSIFICATION OF ACALA SEED IN 1923

The Acala Cotton Growers' Association of the Coachella Valley furnished rogued seed for all of the Acala cotton planted in the Coachella Valley in 1923. This did not include quite all of the 3,519 acres of Acala grown, since a small proportion of this acreage consisted of ratooned cotton. This ratooned cotton, however, was handled on the same basis as the planted cotton, provided rogued Acala seed had been used in the original planting.

As in 1922, all the cotton fields of the valley were visited and classified by the secretary of the association and a representative of the Department of Agriculture. It was found that only 3.4 per cent of the valley acreage consisted of other varieties, and that 5.5 per cent (195 acres) of the Acala acreage was too close to these fields to permit the seed to be saved for planting purposes. It was also found that 11.5 per cent (404 acres) of the Acala acreage was grown on land previously in other varieties, and the seed was therefore disqualified for planting purposes. This included Acala grown on land planted to another variety in any previous year, either without an intervening crop of Acala cotton or with an intervening planting of some other crop.

Eighty-three per cent of the Acala acreage was grown on clean land and isolated from fields of other varieties. Seed from this acreage alone was designated as planting seed, seed from the rest of the Acala fields being designated as oil-mill seed.

The data showing the amount of contamination from other varieties in 1923 are given in Table 2 (p. 41) in comparison with similar data for other years.

### GINNING IN 1923

Of the 3,641 acres of cotton grown in the Coachella Valley in 1923, 3,519 acres, or 96.6 per cent, consisted of Acala, leaving only 122 acres devoted to other varieties. Since such a small part of the valley cotton acreage was planted with varieties other than Acala, both of the valley gins agreed to restrict their ginning to Acala and to continue this policy in the future. This action by the ginners eliminated from the valley the greatest cause of varietal mixture and also had the effect of making it more inconvenient to grow other varieties. This policy was adopted at the suggestion of the association because it was now apparent that the local sentiment was overwhelmingly in favor of Acala and of growing only one variety. Under these conditions it was to the best interest of the valley, and therefore to the best interest of the gins, for the valley to become a 100 per cent Acala community.

The ginners regard themselves very much in the light of a public utility and do not like to refuse to gin anyone's cotton, particularly if their competitors will gin it. Consequently, unless a gin draws on one area alone for its customers and this area is entirely in one variety, it is very important to make the same arrangements at all gins in the community. If they are not all included in such an arrangement, the competition between varieties will become identified with the competition between gins and will delay the attainment of a one-variety community.

In the Coachella Valley it was not practicable before 1923 for the ginning to be restricted to Acala, since prior to that year Acala had not constituted more than 85.1 per cent of the valley acreage. The nearest gin outside the Coachella Valley is in the Imperial Valley, a distance of about 70 miles. Shipping as much as 15 per cent of the valley cotton that distance for ginning would have been impracticable and would have resulted in a considerable loss to the local gins.

In 1923, however, the situation was very different, since only 3.4 per cent of the valley acreage consisted of varieties other than Acala and only a few reactionary growers would be affected. The gins were furnished with the names of those who grew other varieties, and they notified these growers that their cotton would not be ginned locally. Transportation was provided by the owner of one of the gins, and all seed cotton from the Durango and Mebane fields was hauled by motor truck to the Imperial Valley for ginning. Since these growers were definitely known and their acreage was small, the situation could be successfully handled; but to keep away from the local gins a large percentage of the cotton would have been much more difficult.

Though the greatest cause of varietal mixture had been eliminated, the necessity for cleaning the gin machinery was not entirely obviated. There were 404 acres of Acala grown on land previously in another variety, 195 acres of Acala were not isolated from the fields of other varieties, and the gin machinery had to be cleaned when-

ever a bale of Acala, from which the seed was to be saved, followed a bale from these fields. However, since 83 per cent of the Acala acreage was grown in clean, isolated fields, the gin machinery did not have to be cleaned very often.

A total of 3,245 bales were ginned from the 3,519 acres of Acala grown in the valley in 1923. The yield per acre was 0.92 of a bale, which showed an improvement over the valley yield for 1922. The yield of the Durango and Mebane fields in 1923 is not known, since the seed cotton was shipped out of the valley for ginning.

Thus in 1923 the valley acquired most of the advantages of a one-variety community, and this was accomplished largely as a result of the sale of the rogued seed at cost. The valley cotton acreage was 96.6 per cent Acala, and only Acala was ginned in the valley.

### SALE OF ASSOCIATION SEED, CROP OF 1923

The Acala Cotton Growers' Association of the Coachella Valley continued the policy of saving seed only from those fields which had been planted with the rogued seed and which were grown on clean, isolated land. All other seed was consigned to the oil mill. The seed saved was recleaned and put up in 100-pound sacks stenciled with the association's brand, as in previous years.

The association is a nonprofit organization, and all of the money received for the seed is returned to the growers, minus only the expenses of selling. For this reason the association had no way of paying for the seed as ginned, and the grower had to wait for his seed money until the seed had been sold and the money collected. Very little planting seed is sold in the fall, and even though the funds were distributed as soon as collected, it was several months before the grower received his seed money. He realized, however, a much better price than he would have received had his seed been sold to the oil mill as ginned.

According to the association's requirements Acala seed from 2,920 acres could qualify for planting purposes, but this quantity of seed was not handled by the association. Even though their seed could qualify for planting purposes, a good many growers preferred to sell to the oil mill and get their money immediately, as long as the oil-mill price continued rather high. This was frequently the case with renters who had obligations to meet.

Thus it would appear possible, in such a community as the Coachella Valley, for the gins, instead of selling this good seed to the oil mill, to go into the planting-seed business themselves in competition with the association. However, when the planting seed is being handled by a community organization, such a procedure on the part of the gins would be destructive to the community project and therefore against the gins' ultimate interest, since the more money the grower makes, from his seed as well as from his lint, the more cotton will be raised and the more there will be to gin. The Coachella Valley gins recognized this fact and wished to aid the community project in every way, so they agreed to sell to the oil mills, for crushing purposes, all seed bought in the Coachella Valley.

One or two individual growers saved their seed and offered it for sale in competition with the association. However, prospective

customers are much more likely to feel confidence in an association representing the entire community than in dissident individuals.

From the valley crop of 1923 the association saved 515 tons of Acala seed for 1924 planting in other districts. The demand for Acala seed was so great that by the first of March it was all sold and many orders had to be refused. The wholesale price had been lowered to $100 a ton delivered, and a return of $60 a ton was made to the growers.

At 20 pounds to the acre, 515 tons of seed would plant 51,500 acres. Most of the seed went to Arizona as in 1922, but a good share of it went to the Imperial Valley, where an effort was being made at that time to procure better planting seed and form a one-variety community. It is evident from these figures that the efforts of the Coachella Valley cotton growers to organize themselves on a one-variety basis, and thus make pure Acala planting seed available for planting in other districts, was of great benefit to the cotton industry of the entire Southwest.

The data regarding the sale of association Acala seed from the crop of 1923 are given in Table 4 (p. 41) in comparison with similar data for other years.

### BREEDING WORK IN 1923

In 1923 practically all of the Coachella Valley Acala acreage was planted with seed from the fields rogued in 1922. This stock of seed had now been rogued for four successive years, and its use by the entire community constituted a definite advance in the community organization and resulted in a general improvement in the character of the cotton grown.

Special fields were rogued in 1923 to supply the Coachella Valley planting seed in 1924. All of the new-stock seed produced by the 1922 breeding block at the United States Experiment Date Garden was planted in fields to be rogued, but there was only enough of this seed to plant 27 acres. This acreage was carefully rogued during the growing season by representatives of the Department of Agriculture.

Since 27 acres could not produce enough seed to plant the entire cotton acreage of the Coachella Valley in 1924 if it should equal or exceed the 1923 acreage, it was necessary to rogue some of the fields planted with the original-stock seed. Consequently 40 acres of the original-stock cotton were rogued in addition to the 27 acres of new-stock cotton.

The 67 acres rogued produced 68 bales and 71,996 pounds of seed for planting in the Coachella Valley in 1924. The 27 acres of new-stock cotton rogued produced 28 bales and approximately 14 tons of seed. The 40 acres of original-stock cotton rogued produced 39 bales and approximately 20 tons of seed. The acreage rogued and the yield are also given in Table 5 (p. 41) in comparison with similar data for other years.

The system of ginning the rogued cotton practiced in 1922 proved to have some disadvantages, and since an increased number of acres had been rogued in 1923, it was desirable to find some other means of handling the cotton from the rogued fields at the gin.

In 1922 it had proved rather difficult to get all the rogued cotton to the gin at one time without holding up the regular ginning. The rogued ginnings were not very frequent, and growers who had a considerable acreage of rogued cotton found it difficult to hold the seed cotton over for the rogued days without piling it on the ground. If the grower could not gin, the only way to avoid piling the cotton on the ground was to let the pickers go until after he had been able to gin, and it frequently proved difficult to get pickers again.

To overcome these difficulties a house for storing the rogued seed cotton was erected at the gin. This house was divided into several bins and one bin assigned to each grower. The grower could then bring his rogued cotton to the gin at any time and unload it into his bin. When 10 or 15 bales had accumulated, arrangements were made for ginning. The rogued cotton was usually ginned at night to avoid holding up the regular ginning. The gin machinery was thoroughly cleaned, a suction pipe was laid out to the bins, and the rogued cotton was run through, each grower's cotton being kept separate. The seed was caught on the floor in front of the gin stands and sacked as ginned. The sacks were labeled and hauled to safe storage. In 1923 the new-stock cotton was always run before the original-stock cotton in order to prevent the original-stock seed from being mixed with the new-stock seed.

Another breeding block was grown at the United States Experiment Date Garden near Indio in 1923. The block was enlarged to 1½ acres in order to produce seed for planting a larger acreage for roguing in 1924. The block consisted only of progeny rows and one increase progeny selected from the new-stock breeding block of 1922. The gin machinery was thoroughly cleaned before the cotton from the breeding block was ginned. The seed was caught on the floor in front of the gin stands, sacked as ginned, and hauled back to the date garden for storage. A good supply of seed was obtained, since the block yielded about 2 bales to the acre.

## PROTECTION OF THE COACHELLA VALLEY ACALA INDUSTRY BY A COUNTY ORDINANCE

In 1923 the Coachella Valley reached the point where practically all the valley cotton acreage consisted of Acala. Breeding work was being carried on to improve the seed stock, and the gins were cooperating to the extent of refusing to gin cotton of any other variety. It was felt, however, that the community needed some sort of protection from newcomers who might not understand the valley situation, from the small reactionary element who could not understand the advantages of one-variety production, and from those who might maliciously plant some other variety.

This matter was taken up with the Riverside County horticultural commissioner (A. E. Bottel) and with the county board of supervisors. These officials quickly recognized the improvements and value of the community organization, and on January 28, 1924, the county board of supervisors passed an ordinance designed to protect the Acala cotton industry of the Coachella Valley.

The ordinance defined and established pure-seed districts in the county and prohibited the planting, transportation, or possession of impure seeds in such districts. The county horticultural com-

missioner was charged with the enforcement of the ordinance, and penalties for violation were stated. The ordinance in full follows:

*Ordinance No. 151*

An ordinance of the county of Riverside, State of California, defining and establishing pure-seed districts within said county; prohibiting the planting in pure-seed districts within said county of impure seeds and plants; prohibiting the importing into or the transportation over or the possession within such pure-seed districts of impure seeds or plants, and providing penalties for the violation thereof

*The board of supervisors of the county of Riverside, State of California, do ordain as follows:*

SECTION 1. For the purposes of this ordinance certain words, phrases, and terms are herein and hereby defined as follows:

(*a*) The word "person" shall include an individual, a copartnership, an association, firm, or corporation, and the singular shall include the plural.

(*b*) The word "township" shall mean a Government township as surveyed and established by the United States Government.

(*c*) The term "pure seed" shall mean seeds that are defined as pure by the official standards of the United States Department of Agriculture.

(*d*) The term "pure-seed district" shall mean a district where the seed of any particular plant is raised for sale for propagating purposes as a business.

SEC. 2. Whenever a majority of the growers of any one seed-bearing crop within one or more townships lying within the county of Riverside, State of California, organize themselves into an association under the laws of the State of California for the purpose of growing, producing, and marketing pure seed of such crop for propagating purposes, such township or townships shall thereupon become and be a pure-seed district within the meaning of this ordinance.

SEC. 3. It shall be unlawful for any person to plant within any pure-seed district in the county of Riverside any seeds or plants of any other variety or varieties of the pure-seed crops being grown in such pure-seed district.

SEC. 4. It shall be unlawful for any person to transport into or to have in his possession within a pure-seed district in the county of Riverside any seed or plants of any other variety of the pure-seed crops being grown in said district: *Provided*, That this provision shall not apply to seed in transit from a point without such district to a destination without said district nor to interstate commerce passing through said district and not consigned to any point therein: *And provided further*, That the provisions hereof shall not apply to the transportation into or through such district of seed and plants for experimental or technical purposes under the rules and regulations promulgated by the United States Department of Agriculture, the department of agriculture of the State of California, or the office of the horticultural commissioner of the county of Riverside.

SEC. 5. The horticultural commissioner of the county of Riverside is hereby charged with the duty of enforcing the provisions of this ordinance, and all the provisions of the laws of the State of California with relation to the inspection of seeds, plants, and nursery stock consigned to points within the county, the giving of notice of the receipt thereof, and the summary seizure and destruction thereof are hereby expressly made a part of this ordinance.

SEC. 6. Every person who shall violate any of the provisions of this ordinance shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not more than $500 and by imprisonment in the county jail of Riverside County for not more than six months or by both such fine and imprisonment.

SEC. 7. This ordinance shall take effect from and after fifteen days after its passage and before said date shall be published as required by law.

This ordinance went into effect for the season of 1924, and its provisions covered adequately the possible need of the Coachella Valley for the protection of its Acala cotton industry. At any rate, coupled with the local gins' refusal to gin cotton of any variety other than Acala, it had the desired effect, and the one or two growers who had not previously grown Acala planted this variety in 1924.

## DEVELOPMENT OF THE ACALA INDUSTRY IN 1924

### DISTRIBUTION OF ROGUED SEED FOR PLANTING IN 1924 AND ACREAGE GROWN

The rogued Acala seed for planting in the Coachella Valley in 1924 was distributed by the Acala Cotton Growers' Association of the Coachella Valley at cost, as in 1923, and growers who could not pay for the seed at planting time were allowed credit.

The valley cotton acreage was again increased, 4,818 acres being planted, in comparison with only 3,519 acres in 1923. As this increase was rather unexpected, the rogued seed supply was again somewhat short, even though seed did not have to be supplied for the entire 4,818 acres, since some of the valley acreage consisted of ratooned Acala fields. The growers, however, realized the value of the rogued seed and the advantages of community planting of the same stock of seed and reduced the number of pounds of seed planted per acre, which allowed the rogued seed to be spread over practically the entire acreage. This did not appreciably reduce the stands, but such cooperation could not have been obtained from the entire community had a high price been asked for the rogued seed.

Since two stocks of rogued seed, approximately 14 tons of the new and improved stock and 20 tons of the original stock, were available for valley planting in 1924, the situation was complicated to some extent.

However, in distributing the rogued seed for planting in 1924 an attempt was made to restrict the new-stock seed to growers who had clean land and whose seed would be saved for planting purposes, and the original-stock seed to growers whose land had previously been planted to other varieties or who were going to sell their seed to the oil mill.

The problem of cross-pollination did not occur in 1924, since all other varieties had been completely eliminated from the valley and the entire cotton acreage consisted of Acala. The attainment of a 100 per cent Acala community in the Coachella Valley was due (1) to the efforts of the association, whose members were pledged to grow Acala and to sell the rogued seed at cost, (2) to the cooperation of the gins in refusing to gin other varieties, and (3) to the cooperation of the county board of supervisors and the horticultural commissioner in furnishing legal protection.

### CLASSIFICATION OF ACALA SEED IN 1924

Though Acala was the only variety grown in the Coachella Valley during 1924 and rogued Acala seed had been furnished for all the cotton planted, the rogued seed had consisted of two stocks which had to be kept separate.

A record of the stock of seed planted by each grower had been kept, and the fields were visited by the secretary of the association and a representative of the Department of Agriculture. Although the question of isolation did not occur, since all of the cotton grown consisted of Acala, still there were 354 acres where Acala had been planted on land previously in other varieties, part of which acreage consisted of ratooned cotton. There were 4,464 acres of Acala grown on clean land, and of this acreage 926 acres had been planted with new-stock seed.

Since it would be necessary to keep the original-stock seed from being mixed with new-stock seed at the gin and the cotton from fields previously planted to other varieties from being mixed with either of them, the gins were furnished with a list of all growers, designating for each grower the number of acres and the character of the cotton grown.

The new-stock seed used in planting 926 acres in 1924 had been increased from a single row grown in 1921. This row had furnished enough seed for planting an acre in 1922, which was rogued and furnished seed for 27 acres in 1923. The 27 acres were rogued and produced the seed used in making the 1924 planting. The original-stock seed planted in 1924 had now been rogued for five successive years.

### GINNING IN 1924

In 1924 there was no danger of the Acala seed being mixed with other varieties at the gin, but the gin machinery had to be cleaned in order to avoid mixing the two stocks of Acala and to prevent both stocks from being contaminated by Acala seed from fields that had previously grown other varieties.

Arrangements were therefore made for the gin machinery to be thoroughly cleaned whenever a bale of Acala from which the seed was to be saved followed a bale of Acala from fields previously in other varieties, and the rolls were dropped whenever a bale of new-stock cotton followed a bale of the original-stock cotton. A list of all the valley growers, designating the treatment to be accorded each grower's cotton, was furnished the gins. Separate bins for receiving the new-stock and the original-stock seed were erected at the gins.

Since seed was not saved from the entire Coachella Valley cotton acreage, it was not necessary to clean the gin machinery as frequently as might have been expected.

It was unfortunate that two stocks of Acala were grown in the valley during 1924, but it could not have been avoided unless the new-stock seed had been held up for a year. It seemed a much more desirable course to put as much of the improved seed into production as possible and suffer the inconveniences of properly taking care of it. The situation developed because the 1922 breeding block, though adequate for the 1,259 acres of cotton then grown, was not large enough to furnish seed for planting a rogued acreage in 1923 of sufficient size to furnish seed for the 4,818 acres of cotton grown in 1924. After 1922 the breeding block was enlarged to take care of this deficiency.

A total of 4,527 bales was ginned from the 1924 crop. This gave an average yield for the valley of 0.94 of a bale per acre, and since Acala was the only variety grown, this figure indicates the behavior of Acala under the valley conditions. A yield of nearly a bale to the acre for an entire community, which of course includes a considerable quantity of poor cotton, can be equaled in only a few districts. Yields of 1½ bales of Acala cotton per acre, when grown on good land and properly cared for, are of frequent occurrence in the Coachella Valley, and yields of 2 bales per acre and over are not uncommon.

### SALE OF ASSOCIATION SEED, CROP OF 1924

The Acala Cotton Growers' Association of the Coachella Valley continued the policy of saving seed only from clean land planted with rogued seed. Since only Acala cotton was grown in 1924, there was no chance of mixture through cross-pollination, and there were now 4,464 acres of Acala in the valley from which the seed could qualify on this basis.

Not all of the valley growers belonged to the association, many preferring to sell their seed to the oil mill in order to get their money immediately. In 1924, however, the oil-mill market for seed opened very low and many more growers considered joining the association.

The association, as has been stated, is a nonprofit organization and all the funds collected must be distributed to the growers at the close of the season's business. This leaves no provision for the cost of holding the seed in the fall, until it can be sold. Since a considerable expenditure is necessary in order to save the seed, the association has had to borrow money, using the seed as security, in order to tide over until funds begin to come in from the sale of the seed.

The cotton grower usually sells his seed to the gin for milling purposes and receives for it a few dollars more than the cost of the ginning. In the West the average price of mill seed at the gin is perhaps $30 a ton, and since a bale of cotton gins out about 1,000 pounds of seed, the grower receives about $8 in cash in addition to his ginning charge of about $7 a bale. If the seed is not sold to the gin but is saved to be sold as planting seed the next spring, the ginning charge must be met in some other way. Since the growers had been in the habit of meeting their ginning charges by the sale of their seed, the association had been borrowing money to pay the ginning charges when the seed was saved for planting purposes. This system also allowed more seed to be saved.

In 1924 mill seed at the gin opened at $18 a ton, and after paying the ginning charge on his bale the grower received only about $2 cash for his seed, instead of the usual $8. Since the association had been paying the ginning charges for its members and returning to them $60 or more per ton the next spring, many additional growers joined the association at this time, and the association saved for planting purposes 1,168 tons of seed. This represented seed from about 2,336 bales.

But the low oil-mill market, which brought many new members, made it much more difficult for the association to borrow funds to finance the saving of the seed. Ginning charges alone amounted to $14 per ton of seed, and enough stenciled sacks to contain a ton of seed cost $4. These two charges alone, $18 a ton, were equal to the oil-mill value of the seed, without taking into consideration labor for cleaning and sacking, hauling, advertising, etc.

It was found that an investment of $25 or more per ton was necessary in order to save the seed for planting purposes, and for the 1,168 tons of seed saved by the association in 1924 this amounted to about $30,000. In previous years, with a normal oil-mill valuation of $30 a ton, the problem had not been so difficult. But in 1924, to procure the $30,000 necessary to save the seed for planting purposes, when the seed had an oil-mill valuation of only $21,000, was

a problem in finance which required considerable ability for its successful solution.

That the association did succeed in solving the problem was of considerable benefit to other cotton-growing districts, since the association's stock of planting seed was the best available in commercial quantities in the Southwest. This incident demonstrates the value of an organized one-variety community in husbanding commercial quantities of pure planting seed.

Several methods had to be employed in order to obtain the funds needed to save the seed from the oil mill. A certain amount of money could be borrowed on the seed as it was ginned. Part of the seed was sacked and shipped to a bonded warehouse, where a larger amount of money could be borrowed on it. Growers were advised to pay as much of their ginning bills as possible in order to relieve the association of part of that strain. The gins also agreed to extend the association credit for their members' ginning. However, for cotton ginned on credit, the gins felt that they should receive the usual $3 a ton profit made by reselling the grower's seed to the oil mill. This was in many ways a just demand, since if the association members' cotton was ginned on credit and the association kept the seed, the gins would receive neither the money for the ginning nor the seed. It was finally agreed that the gins were to receive their $3 a ton profit on the seed for every bale of cotton ginned on credit from which the association kept the seed. This charge was entered against the accounts of the growers who did not pay for their ginning, so that in the final returns growers who had paid for their ginning received $3 more per ton for their seed than growers who had not paid for their ginning.

As in previous years, the seed was recleaned and put up in 100-pound sacks stenciled with the association brand.

The wholesale price had been reduced to $90 a ton f. o. b. Coachella Valley, but for the first time all of the Acala seed saved by the association was not sold for planting purposes in other districts. On account of the low oil-mill market, the quantity of seed saved was more than double that of 1923, in spite of the financial difficulty. Of the 1,168 tons saved, 627 tons were sold for planting in other districts. This was a larger quantity of seed than had ever before been sold by the association. Though some of this tonnage went to New Mexico, most of it went to Arizona as in previous years. At 20 pounds to the acre this quantity of seed would plant 62,700 acres. The remainder of the seed was sold to the oil mills after the planting season was over, and although the sale of the rogued seed at cost further reduced the returns, the growers finally received $40.05 a ton for their seed. This was a very satisfactory return, considering the low price the grower would have received had he sold his seed to the oil mill as ginned. However, had only the seed sold for planting purposes been saved, the grower would have received about $60 a ton. The above data are also given in Table 4 (p. 41) in comparison with similar data for other years.

Although the new-stock seed and the original-stock seed had been kept separate, the fact that part of the seed consisted of a new and improved stock was not advertised and there was no price differential between the two stocks. All of the new-stock seed was sold

for planting purposes and only seed of the original stock was allowed to go to the oil mill.

### BREEDING WORK IN 1924

In 1924, as in 1923, practically the entire cotton acreage of the valley had been planted with rogued Acala seed. In 1924, however, a good share of the acreage had been planted with rogued seed of an improved stock which improved the quality of the local cotton and made an appreciable quantity of better seed available to the Southwest. All of the fields rogued in 1924 had been planted with new-stock seed produced by the 1923 breeding block grown at the United States Experiment Date Garden. The seed had been distributed among several growers, as a safeguard to the stock, and a total of 85 acres was rogued. This rogued acreage produced 96 bales, which gave about 54 tons of seed to be used for planting in the Coachella Valley in 1925. The cotton from the rogued fields was stored in a special house at the gins until a sufficient quantity had accumulated to justify cleaning the gin machinery and properly taking care of the seed.

Another 1½-acre breeding block was planted at the date garden. (Pls. 4 and 5.) The breeding block consisted of progeny rows and seed from the best increase progeny of the 1923 breeding block. The progeny rows were studied and compared and additional individual plants were selected in the fall. The gin machinery was thoroughly cleaned before the cotton from this block was run through. The seed was caught on the floor, sacked as ginned, and hauled back to the date garden for safe storage.

## STATE LEGISLATION PROTECTING ONE-VARIETY DISTRICTS

As previously stated, when the problem of legally protecting the Coachella Valley Acala community from the possibility of damage through ignorance or design was brought to the attention of county officials, a county ordinance, designed to answer this need, was passed. The county officials, however, recognized that the constitutionality of the ordinance might be questioned, and the possibility of procuring State legislation protecting one-variety communities was therefore considered.

With this object in mind, County Horticultural Commissioner A. E. Bottel arranged for a cotton conference to be held at Riverside, Calif., March 15, 1924. The conference was well attended, growers and representatives from all of the cotton-growing districts of the State being present. Papers were read regarding the advantages of the community production of one variety of cotton. Before the conference adjourned an association to be known as the California Cotton Growers' Association was formed. H. H. Clark, a prominent cotton grower and the manager of a large cotton plantation in the Imperial Valley, Lower California, Mex., was elected president of the organization. Mr. Clark was very much interested in one-variety production, and his company, which grows more than 100,000 acres of cotton, was already devoting its entire acreage to the production of Acala. A legislative committee was appointed to investigate the possibility of obtaining State legislation protecting

ACALA COTTON BREEDING BLOCK, UNITED STATES EXPERIMENT GARDEN, INDIO, CALIF., 1924 DATE

TIP OF ACALA COTTON PLANT FROM BREEDING BLOCK AT UNITED STATES EXPERIMENT DATE GARDEN, INDIO, CALIF., 1924

Note the top crop of large bolls. Most of these bolls escaped frost damage

one-variety districts. Counsel for the association were appointed and were instructed to investigate the legal difficulties and the constitutionality of a State law providing for the growing of only one variety of cotton within a district.

On October 19, 1924, the California Cotton Growers' Association held another meeting at Riverside, and the association's counsel presented their findings. It was their opinion that the community itself did not have authority to declare a one-variety district, but that such authority was vested in the State legislature by the State constitution, and that the legislature could not delegate this authority. On this basis they believed that a State law which named the variety to be grown and the districts in which it was to be grown exclusively would be constitutional. The following resolution was then prepared and unanimously adopted:

*Resolved:* That Messrs. Wing and Whitlock, counsel for the association, be instructed to draft a bill providing for the growing of cotton of one variety only in such districts of California as may be shown to be practically agreed upon the desirability of such a bill and the variety of cotton to be grown within the district.

Further, to make provisions in the bill for the inclusion of other districts when the growers in those districts manifest a desire to be included within its provisions.

Said bill is also to permit a change in the variety of cotton grown within a district when the advancement in the science of growing cotton shows it to be desired.

In order that said advancement may be accomplished, the bill is to permit experiments with other varieties of cotton to be carried on only by the United States Department of Agriculture and the California State Department of Agriculture.

A special feature of the bill is the keeping of cottonseed pure. One necessary point in the accomplishment of this is to provide in the bill that all gins in the restricted districts shall confine their ginning to the one variety grown in that district.

Representatives from all the cotton-growing districts of the State were present at this meeting, and the districts to be included in the bill were considered. The Coachella Valley in Riverside County was already growing Acala exclusively, and since the Palo Verde Valley, another cotton district of the same county, was nearly all planted to Acala and had presented a petition to be included in the bill, the entire county of Riverside was included. The cotton-growing counties of the San Joaquin Valley were now growing Acala almost exclusively and were also to be included. Delegates from the Imperial Valley stated that while they considered such legislation very desirable, the growing of one variety had not yet developed in their county to the point where they could be included in the bill.

Only districts or counties that were already practically united in growing Acala were to be included in the bill, which was designed to protect only those districts that were already applying the one-variety principle, and did not aim to force districts not united in the production of one variety into such a system. On this basis the law would be popular and could be enforced, but to make such a law apply to a district where a large element had not agreed on the best variety to grow would be undesirable, and under these conditions the law, for obvious reasons, would be much more difficult to enforce.

The bill was eventually drawn and introduced in the State legislature on January 16, 1925, by Mr. Murray, of Riverside, Calif. It

became Assembly Bill No. 167 and was referred to the committee on agriculture. The bill passed the assembly March 18, 1925, the Senate March 30, 1925, and was approved May 22, 1925. It became effective 30 days after the governor's signature.

The act in full follows.

*Chapter 299*

An act to provide for the growing of one variety or species of cotton, to wit, Acala, in certain prescribed and defined districts in the State of California; to prohibit the picking or harvesting of any variety or species of cotton other than that known as Acala in such districts; to prohibit the possession within such district for the purpose of planting of any seeds or plants of any variety or species of cotton other than that known as Acala in such districts; to prohibit the ginning of any variety or species of cotton other than that known as Acala in such districts; defining such districts; and fixing the penalty for a violation of this act

*The people of the State of California do enact as follows:*

SECTION 1. The legislature hereby declares that the purposes of this act are to promote, encourage, aid, and protect the planting and growing of cotton in the State of California; that it believes this purpose best can be accomplished by restricting within certain areas hereafter defined the planting and growing of but one variety or species of cotton, to wit, "Acala"; that by this means alone is it possible to bring the cotton-growing industry in the State to its highest possible development and to insure the growing of the most superior and economically most profitable variety or species of cotton; that the planting of pure seed is essential to the production of a more merchantable and better grade of cotton and cotton seed and for the production of a grade of fiber best suited for manufacturing purposes; that the planting of impure seed or plants other than that permitted in the areas hereinafter defined is an economical harm and loss to the planter thereof and an irreparable injury to the adjoining or neighboring growers; that the restriction of the use to which cotton lands may be used, as provided in this act, is essential to the highest development of the cotton-growing industry and of benefit even to one who would violate the provisions of this act; that it is essential that but one variety of cotton should be ginned in the districts in this act defined, otherwise the gin will mix the different kinds of seed, crossing takes place in the fields, the varieties are mongrelized and cease to be uniform, the fiber deteriorates in quality, and the seed is rendered unfit for planting; that solely by restricting the growing of one variety or species of cotton in certain areas can the fiber be grown of uniform length and quality, and the highest price paid for the cotton thus obtained, and the production of fiber of different lengths or grades be prevented; that fibers of different lengths and grades are commercially inferior and when assembled in one lot or grade are classed and given the value of the lowest grade in the lot or sample; that Acala cotton is now the variety or species of cotton that has been most highly developed and improved and most suited commercially for growing in the districts in this act defined; that if future experiments should develop an improved variety or species of cotton, this bill can be amended to designate it; and that the districts in this act defined can be altered, restricted, or extended.

SEC. 2. This act shall be so interpreted and construed as not to be considered the taking of private property without due process of law; nor disturbing the owner in the control or use of his land for lawful purposes; nor restricting his right to dispose thereof, but as a declaration by the legislature that its use for the purposes herein forbidden is prejudicial to the public interests and an economical loss to the State and an irreparable loss and injury to the cotton growers.

SEC. 3. In the districts in this act defined, it shall be unlawful to plant any seeds or plants of any variety or species of cotton other than the seeds or plants of that variety or species known as Acala.

SEC. 4. It shall be unlawful in the districts in this act defined to pick or harvest cotton of any variety or species other than that known as Acala.

SEC. 5. It shall be unlawful for any person, individual, copartnership, association, firm, or corporation, or agent or employee thereof, to have in his or its possession within the districts in this act defined for the purpose of planting any seeds or plants of any variety or species of cotton other than that known as Acala.

SEC. 6. It shall be unlawful for any gin located or operating in any one of the districts in this act defined to gin any variety or species of cotton other than that known as Acala.

SEC. 7. District number one shall consist of the county of Riverside; district number two shall consist of the county of Kern; district number three shall consist of the county of Madera; district number four shall consist of the county of Fresno; district number five shall consist of the county of Kings; district number six shall consist of the county of Tulare; district number seven shall consist of the county of Merced; district number eight shall consist of the county of Stanislaus; district number nine shall consist of the county of San Joaquin.

SEC. 8. Any person, individual, copartnership, association, firm, corporation, agent, or employee who or which shall violate any of the provisions of this act shall be deemed guilty of a misdemeanor, and, in addition thereto, shall be liable in a civil action for all damages that may be occasioned or caused by a violation of this act.

SEC. 9. If any clause, sentence, paragraph, or part of this act shall, for any reason, be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair, or invalidate the remainder thereof, but shall be confined in its operation to the clause, sentence, paragraph, or part thereof directly involved in the controversy in which such judgment shall have been rendered. The legislature hereby declares that it would have passed this act irrespective of the fact that any clause, sentence, paragraph, or part thereof be declared unconstitutional.

SEC. 10. That this act shall not apply to the planting or growing of cotton in the experimental stations or farms conducted by the United States Government; the State of California; nor to the transportation of seed or plants by interstate or intrastate commerce, nor to seed in transit from a point without one of the districts in this act defined to a destination without such district; nor to the transportation of plants or seeds into one of the districts hereinafter defined for experimental or technical purposes by the United States Department of Agriculture or the department of agriculture of the State of California.

SEC. 11. All acts and parts of acts in conflict herewith are hereby repealed.

The enactment of this legislation by the State of California gave added stability to the one-variety districts and constituted the first recognition by State legislation of the fact that the growing of more than one variety of cotton is injurious to the community welfare. As has been pointed out by O. F. Cook,[5] such laws may be considered as analogous to those establishing other community improvements, such as irrigation or drainage districts, elimination of noxious weeds or diseases, and zoning laws.

## LEGISLATION PROVIDING FOR STATE CERTIFICATION OF COTTONSEED

A bill providing for the State certification of cottonseed was also introduced by Mr. Murray on January 16, 1925. It eventually passed both houses of the State legislature and was approved by the governor May 23, 1925.

The act authorized and charged the director of agriculture of the State of California "with the duty of drawing up regulations and standards as the basis for the certification of pure cottonseed in the State of California, and to fix, establish, and collect reasonable fees for the certification of pure cottonseed."

Rules and regulations for cottonseed certification were drawn and made effective in their final form October 16, 1925. The duty of carrying out the provisions of the act came under the bureau of

[5] Cook, O. F. Cotton improvement laws in California. Jour. Heredity, 16: 335–338. 1925.

grain, seed, and warehouse standardization of the State department of agriculture.

The regulations stated that an acceptable source of seed must have been used in planting the fields from which seed was to be certified; that the previous crop must have been cotton of the same variety or some crop other than cotton; that the fields must be isolated by at least 1 mile from fields of another variety; and that the cotton must be handled at the gin in a manner that would prevent the seed from becoming mixed. A sliding scale of fees was established with a decreasing cost per ton for large tonnages handled as a unit. These regulations were established too late to be applied to the crop of 1925 seed, but will undoubtedly prove useful in the future.

It was not considered feasible to restrict cottonseed certification to one-variety communities, but the regulations as finally adopted recognized the various ways in which cottonseed could become mixed, and the restrictions would be much more difficult to meet in mixed-variety communities.

## DEVELOPMENT OF THE ACALA INDUSTRY IN 1925

### DISTRIBUTION OF ROGUED SEED FOR PLANTING IN 1925 AND ACREAGE GROWN

In 1925, as in 1923 and 1924, the rogued Acala seed for planting in the Coachella Valley was sold at cost, and growers who could not pay for the seed at planting time were allowed credit. The supply of rogued seed was ample for planting the 4,227 acres of cotton grown in the valley in 1925.

The policy of making the rogued seed available to the local community at cost, since its adoption for planting the 1923 crop, had proved highly successful. This policy was largely responsible for the Coachella Valley's success in establishing a one-variety Acala community. In 1925 the policy was responsible for carrying the community organization a step farther, in that the entire valley was not only planted to the same variety, but was planted with seed of the same quality or stage in the breeding process of that variety.

Even in a one-variety community a certain amount of degeneration will occur in the seed stock. This degeneration is caused by the occasional appearance of different or "off-type" plants, and when these off-type plants are harvested with the crop the amount of contamination increases from year to year. Degeneration from this cause is much slower than where different varieties are allowed to mix together, and it can be avoided by planting seed increased from typical individual plants and by roguing or removing the off-type plants from the seed supply.

It thus becomes evident that even though only one variety is grown in a district, if some of the growers plant their own seed back year after year while others plant selected and rogued seed, the community will eventually reach the point where it is as badly off as if more than one variety were grown.

For this reason the policy of selling the rogued seed at cost to all local growers, whether association members or not, was continued in 1925, even though only Acala cotton was grown and a county ordinance and a State law prohibited the planting of any other

variety. The valley cotton growers recognized the advantages of the rogued seed, and since the price was not prohibitive they all came to the association to procure their planting seed. Since all of the rogued seed distributed for planting in 1925 consisted of the new stock, production of this improved cotton was established on the basis of the entire valley, with the exception of a few acres ratooned from the year before. It can be stated definitely in the light of previous experience that if the new-stock rogued seed had not been made available to the valley at cost the valley-wide substitution of the new and improved stock for the original stock would not have been so completely successful.

The 1925 cotton acreage of the Coachella Valley is shown in Table 1 (p. 40) in comparison with acreage data for previous years.

### CLASSIFICATION OF ACALA SEED AND GINNING IN 1925

Since for two years Acala had been the only variety grown in the valley and rogued seed of the new stock had been used for all the cotton planted in 1925, the problem of classifying the Acala seed was now considerably simplified.

In 1925 the only cotton of the original-stock Acala left in the Coachella Valley consisted of a few acres ratooned from the year before. Very little of the original-stock cotton had been ratooned in 1925, since most of the growers who might have ratooned preferred to replant their fields with new-stock seed rather than ratoon the original-stock cotton. Ratooning was also discouraged by a regulation issued by the association to the effect that it would not save seed from ratooned fields. Seed from ratooned plants is genetically as good as seed produced the first season after planting, but cotton ratooned in 1925 would have consisted partly of the original stock, so the practice was discouraged entirely. Also the danger from noxious weed seed is greater with fields of ratooned cotton than with fields that have been plowed and replanted, unless the ratooned cotton has been very well cared for.

The gin machinery was cleaned whenever cotton from which the seed was to be saved followed a bale from a ratooned field of the original stock. But the gin machinery did not have to be cleaned very often, since ratooned cotton matures much earlier than planted cotton and a large share of it is ginned before much of the planted cotton has been picked.

The season of 1925 was considered rather unfavorable for cotton in the Coachella Valley. The crop was later than usual, but the final production was 3,685 bales from 4,227 acres, an average yield of 0.87 of a bale to the acre, which is very satisfactory. One of the features of the Acala variety is its ability to continue growth in the fall and produce a crop when more determinate varieties have stopped growing. The 1925 yield data from the valley are also given in Table 3 (p. 41) in comparison with similar data for previous years.

### SALE OF ASSOCIATION SEED, CROP OF 1925

The planting seed made available to other districts by the Acala Cotton Growers' Association of the Coachella Valley now consisted entirely of an improved stock. This stock was of a better type and

was much more uniform in plant characters than the original stock. The bolls were larger and the fiber longer and more uniform. Plantings made in Arizona from this stock of seed had given very satisfactory results, and the fact that a large quantity of improved Acala seed, produced under one-variety conditions, was saved and made available for planting in other districts at a reasonable price constituted an improvement in cottonseed production which was of great value to the growers.

In 1924 the association had experienced financial difficulties in saving the seed on account of the low oil-mill market, and in 1925 the value of a community association in saving good stocks of seed was demonstrated in another way. During the ginning season considerable competition developed between the oil-mill interests and cottonseed was bid up to over $40 a ton. During such periods of abnormally high oil-mill prices, much seed that it would be highly desirable to save for planting purposes is likely to be sold to the oil mills. If the association had not been in existence, much more of the Coachella Valley Acala planting seed would have been lost in this way. Any members who failed to comply with their five-year contract to handle their seed through the association would have been sued, but difficulty was experienced in holding only one or two of them.

The association saved about 550 tons of seed from the crop of 1925. The seed was recleaned and put in 100-pound sacks stenciled with the association's brand, as in previous years. The wholesale price was continued at $90 a ton and the entire quantity of seed was sold for planting in other districts in 1926. As in previous years most of the seed went to Arizona. At 20 pounds to the acre this quantity of seed would plant 55,000 acres. The data regarding the sale of association seed in 1925 are also given in Table 4 (p. 41) in comparison with similar data for previous years. The final return to the grower from the crop of 1925 seed is not available at the time of this writing.

#### DESCRIPTION OF THE BREEDING PROCESS AND BREEDING WORK IN 1925

The system for the improvement and increase of the Acala seed stocks begun in 1922 was continued in 1925. Another breeding block was grown at the United States Experiment Date Garden, and fields for roguing were planted with special seed. A more detailed description of this system and of its relation to the community follows.

The breeding block consists of progeny rows and one increase progeny selected from a like breeding block grown the year before. Each progeny row is planted with seed from one plant which had been selected because it was typical and not because it was different or possessed some new feature. The rest of the block is planted with seed produced by the most uniform progeny row of the preceding year's breeding block. Every possible care should be taken to select only typical plants and rows for propagation, since a different even though desirable plant may contaminate the stock. Such variants should be isolated. The breeding block should be as uniform as possible, and in a well-bred variety the plants must be studied carefully, since selection will depend upon slight differences or im-

provements and not upon wide fluctuations that can be easily recognized.

The breeding block is rogued carefully several times during the growing season and all off-type or rogue plants removed. Notes are taken on the progeny rows, and promising plants are tagged. In the fall additional individual plants or progenies are selected, the progeny rows are carefully studied and compared, and the most promising one is picked separately for further propagation. These selections are used to plant the next year's breeding block.

The fields to be rogued are planted with seed increased from an individual plant selected three years before. The first year after selection it forms one row in the breeding block, the second year it forms the increase planting of the breeding block and produces enough seed to plant the rogued fields. The selection is carefully studied during these years and compared in tests with other selec-

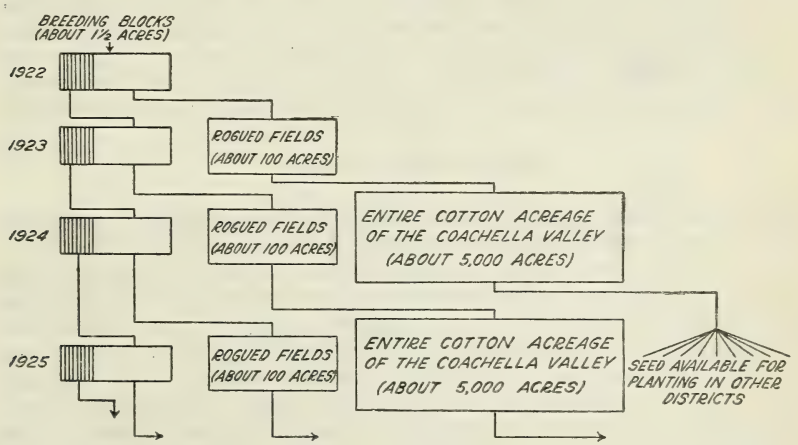
BREEDING BLOCKS (ABOUT 1½ ACRES)
1922
1923
ROGUED FIELDS (ABOUT 100 ACRES)
1924
ROGUED FIELDS (ABOUT 100 ACRES)
ENTIRE COTTON ACREAGE OF THE COACHELLA VALLEY (ABOUT 5,000 ACRES)
1925
ROGUED FIELDS (ABOUT 100 ACRES)
ENTIRE COTTON ACREAGE OF THE COACHELLA VALLEY (ABOUT 5,000 ACRES)
SEED AVAILABLE FOR PLANTING IN OTHER DISTRICTS

FIG. 2.—Diagram showing the breeding and seed-increase processes in relation to the community planting. The lines at the left of the breeding blocks represent progeny rows planted with seed from individual plants selected from the breeding block of the year before

tions to determine whether or not it is deficient in yield or has other undesirable features.

The rogued fields furnish, in the case of the Coachella Valley, seed for planting the cotton acreage of the entire community, and the fourth year after the individual plant was selected the increased seed is made available for planting in other communities also. Only in districts where the yields are high, as in the Coachella Valley, can selected seed increase as rapidly as above outlined.

Fields which include all the stages of the breeding process are grown in the Coachella Valley community each year. Their relationships are shown graphically in Figure 2.

Figure 2 illustrates the system of Acala breeding and seed increase now in operation in the Coachella Valley but is not accurate in regard to the acreage shown for the different years. Though the system is now operating on the basis of 5,000 acres, it was not begun on that basis, since in 1922 only 1,259 acres of cotton were grown.

The accurate figures have all been given in the text covering the different years and appear also in the tables.

All of the fields rogued in the Coachella Valley in 1925 had been planted with seed increased from a single plant selected from the 1922 breeding block. The 87 acres rogued produced 105 bales, which gave about 50 tons of seed, an ample supply for planting the entire Coachella Valley in 1926. The cotton from the rogued fields was stored in a special house and ginned only after the gin machinery had been thoroughly cleaned, as already described. This precaution is desirable with the rogued seed even in a one-variety community.

The rogued-seed data for 1925 are shown in Table 5 (p. 41) in comparison with similar data for previous years.

The general quality of the 1925 crop was much improved, since the entire cotton acreage of the valley had been planted with new-stock seed increased from the best progeny row of the 1922 breeding block and rogued each year. Thus the seed for planting the entire cotton acreage of the valley in 1926 was the increase from a single plant selected from the 1922 breeding block. Through the community association this improved seed will be made available to other cotton districts.

## TABULATION OF DATA

Statistical data of the Coachella Valley community project in growing Acala cotton are presented in Tables 1 to 6, inclusive.

Table 1 gives the acreage planted in each variety of cotton from year to year and shows the yearly progress in establishing Acala as the sole variety grown in the community. The gradual elimination from the valley of the contamination of Acala seed by other varieties and the attainment of 100 per cent of Acala grown on land that was clean and isolated are shown in Table 2. Statistics of cotton and seed producton and of cost and sales of seed appear in the other tables.

TABLE 1.—*Total cotton acreage and acreage planted to each variety in the Coachella Valley, Calif., 1920–1925*

| Year | Total cotton acreage | Acala | | Durango | | Mebane | |
|---|---|---|---|---|---|---|---|
| | | Acres | Percentage of total | Acres | Percentage of total | Acres | Percentage of total |
| 1920 [1] | 3,241 | 1 | 0.01 | 1,620 | 50.0 | 1,620 | 50.0 |
| 1921 [1] | 900 | 300 | 33.3 | 300 | 33.3 | 300 | 33.3 |
| 1922 | 1,259 | 1,071 | 85.1 | 171 | 13.6 | 17 | 1.3 |
| 1923 | 3,641 | 3,519 | 96.6 | [2] 95 | 2.6 | 27 | .8 |
| 1924 | 4,818 | 4,818 | 100.0 | 0 | 0 | 0 | 0 |
| 1925 | 4,227 | 4,227 | 100.0 | 0 | 0 | 0 | 0 |

[1] The figures for 1920 and 1921 are approximate, being based on the number of bales ginned. The figures for other years were determined by an actual survey of the acreage.

[2] Includes 62 acres of ratoon cotton.

TABLE 2.—*Acreage of Acala cotton on land that was not clean, on land that was not isolated, and on land that was both clean and isolated, Coachella Valley, Calif., 1922–1925*

| Year | Total acreage of Acala cotton | Land not clean | | Land not isolated | | Land clean and isolated | |
|---|---|---|---|---|---|---|---|
| | | Acres | Percentage of total | Acres | Percentage of total | Acres | Percentage of total |
| 1922 | 1,071 | 200 | 18.7 | 123 | 11.5 | 748 | 69.8 |
| 1923 | 3,519 | 404 | 11.5 | 195 | 5.5 | 2,920 | 83.0 |
| 1924 | 4,818 | 354 | 7.3 | 0 | ---- | 4,464 | 92.7 |
| 1925 | 4,227 | 0 | ---- | 0 | ---- | 4,227 | 100.0 |

TABLE 3.—*Acreage and yield of Acala cotton in the Coachella Valley, Calif., 1922–1925*

| Year | Acres | Bales of cotton | Bales per acre | Year | Acres | Bales of cotton | Bales per acre |
|---|---|---|---|---|---|---|---|
| 1922 | 1,071 | 850 | 0.79 | 1924 | 4,818 | 4,527 | 0.94 |
| 1923 | 3,519 | 3,245 | .92 | 1925 | 4,227 | 3,685 | .87 |

TABLE 4.—*Quantity of seed sold by the Acala Cotton Growers' Association of the Coachella Valley, the wholesale price, and the amount returned to the growers, 1921–1925*

| Year grown | Tons of seed sold | Wholesale price per ton | Amount returned to growers per ton | Year grown | Tons of seed sold | Wholesale price per ton | Amount returned to growers per ton |
|---|---|---|---|---|---|---|---|
| 1921 | 44 | $75–200 | $81.25 | 1924 | [2] 1,168 | $90 | $40.05 |
| 1922 | 256 | [1] 160 | 84.03 | 1925 | 550 | 90 | ([3]) |
| 1923 | 515 | 100 | 60.00 | | | | |

[1] Delivered.
[2] Only 627 tons of the seed saved in 1924 was sold as planting seed. The remaining 541 tons was sold to the oil mill after the planting season.
[3] Not determined at time of writing.

TABLE 5.—*Acreage and yield of rogued Acala cotton, Coachella Valley, Calif., 1922–1925*

| Year | Acres rogued | Bales produced | Seed produced (pounds) | Year | Acres rogued | Bales produced | Seed produced (pounds) |
|---|---|---|---|---|---|---|---|
| 1922 | 46 | 47 | 47,258 | 1924 | 85 | 96 | 109,070 |
| 1923 | [1] 67 | 68 | 71,996 | 1925 | 87 | 105 | 99,327 |

[1] Forty acres of this consisted of original-stock seed. This field produced 39 bales of cotton fiber and 14,479 pounds of seed.

TABLE 6.—*Estimated cost per ton of holding and distributing rogued cottonseed in the Coachella Valley, Calif.*

| Item | Cost per ton |
|---|---|
| Average oil-mill price of seed (approximate) for several seasons | $30.00 |
| Sacks | 4.00 |
| Labor (cleaning gin, shoveling, sacking, and bagging seed) | 3.40 |
| Drayage to storage | 1.00 |
| Storage rental | .50 |
| Insurance (for $50 a ton) | .75 |
| Night watchman (estimated) | 1.00 |
| Shrinkage and wastage, 5 per cent (based on $30 a ton) | 1.50 |
| Bad accounts, 3 per cent (based on $60 a ton) | 1.80 |
| Distribution (clerk hire) | 3.80 |
| Prorata share of pertinent overhead (management, accounting, interest, etc.) | 11.60 |
| Total | 59.35 |

## PREMIUMS OBTAINED FOR ACALA FIBER

Since the inception of the Acala industry in the Coachella Valley the growers had been able to obtain premiums for their Acala fiber. The amount of the premium of course varied with the time of year at which the cotton was harvested and with the quality of the cotton from various farms, which depends upon the kind of soil and the attention given the crop during the growing stage. The extra value of the better cotton also fluctuates on account of market conditions, greater premiums being paid during some periods than during others.

The new-stock Acala cotton brought a higher price than the original-stock Acala and increased the value of the valley cotton crop still further. Through the distribution of new-stock Acala seed to other cotton-growing districts by the community association, a much wider area will receive this benefit.

The premiums, or "points on," paid for the Coachella Valley Acala cotton ranged up to 5 cents a pound for the new-stock cotton. Perhaps an average figure for the season of 1925, when all the valley cotton consisted of new-stock Acala, would be about 3 cents a pound. When multiplied by 500 to get the increased value per bale, and then by the number of bales produced by the community, a figure is obtained that shows very handsome returns from the effort of maintaining a superior type of cotton.

Although the community production of but one superior variety of cotton benefits the manufacturer, to overcome the inertia of the present system of buying and to obtain for the community the extra value thus produced is not a simple problem and should receive the community's full attention.

Reputable firms usually pay a premium for superior fiber, and when an appreciable supply of such fiber can be obtained within a community the premium can be increased. A one-variety community can thus without difficulty profit to a certain extent by its efforts; but whether or not such premiums are the nearest the grower can come to the full manufacturing value of his product is another question.

The system of cotton buying in vogue in the Coachella Valley and in many other parts of California is for the home offices of the buying firms to send to their local representatives telegraphic price

limits to govern their buying. The local buyer of course purchases the cotton as cheaply as he can, but he must not go over these limits.

In order to get the benefit of part of the profit made by the local buyers, the Acala Cotton Growers' Association of the Coachella Valley employed an experienced buyer who made arrangements to receive limits from some of the buying firms. The association's buyer was paid a salary, and instead of buying the cotton as cheaply as he could, he paid as much as he could without exceeding his limits. This arrangement was begun in 1924 and worked very well for that season. The association's buyer handled a good share of the cotton, and his operations also had the effect of raising the prices paid by the other buyers, thus obtaining a part of their profits for the grower. But in 1925 the association's buyer could not get such good limits and the plan did not appear so successful.

## UTILIZATION OF COACHELLA VALLEY ACALA SEED IN OTHER COTTON DISTRICTS

From the crops of 1921 to 1925, inclusive, the Acala Cotton Growers' Association of the Coachella Valley distributed about 2,000 tons of Acala seed for planting in other districts. At 20 pounds to the acre this quantity of seed would plant 200,000 acres, but the Acala acreage in California and Arizona increased much more rapidly than this figure would indicate. Many growers who had obtained seed from the association in the earlier years planted their own seed the next year and supplied their neighbors with Acala seed. Thus the quality and value of the cotton produced over a large area was considerably enhanced by the extension of the Acala variety made possible by the organization of the Coachella Valley of California on a one-variety Acala basis. The present extent of this improvement is shown in Table 7, which gives the total 1925 cotton acreage and the acreage devoted to Acala in Arizona, California, and the Imperial Valley of Lower California, Mexico. The seed used in planting practically the entire Acala acreage here listed, with the exception of the San Joaquin Valley of California counties, originated from seed distributed by the association representing the Coachella Valley Acala community during the period from 1921 to 1925. A considerable Acala acreage in New Mexico also originated from seed distributed by the Coachella Valley community but is not shown in Table 7.

TABLE 7.—*Total cotton acreage and Acala acreage for Arizona, California, and the Imperial Valley of Lower California, Mexico, 1925*

| State, county, or district | Total cotton acreage | Acala acreage |
|---|---|---|
| Arizona:[1] | | |
| Maricopa County | 110,000 | 50,000 |
| Yuma County | 28,000 | 3,000 |
| Graham County | 6,000 | 5,000 |
| Pima County | 13,000 | 13,000 |
| Pinal County | 4,000 | 2,000 |
| Greenlee County | 1,000 | 1,000 |
| Cochise County | 1,000 | None. |
| Total for Arizona | 163,000 | 74,000 |

[1] Data for Arizona furnished by Byron J. Showers of the University of Arizona.

TABLE 7.—*Total cotton acreage and Acala acreage for Arizona, California, and the Imperial Valley of Lower California, Mexico, 1925*—Continued

| State, county, or district | Total cotton acreage | Acala acreage |
|---|---|---|
| California: | | |
| Sacramento Valley | 4,000 | 4,000 |
| Madera County, north | 16,400 | 16,400 |
| Fresno County | 17,000 | 17,000 |
| Kings County | 12,000 | 12,000 |
| Tulare County | 15,200 | 15,200 |
| Kern County | 30,500 | 30,500 |
| Riverside County | 24,300 | 23,000 |
| Imperial County | 50,600 | 5,000 |
| Total for California | 170,000 | 123,100 |
| Imperial Valley, Lower California, Mexico | 150,000 | 125,000 |
| Combined total | 483,000 | 322,100 |

## CONCLUSIONS

No attempt has been made in the preceding pages to enumerate the advantages and reasons for community production of one variety. A number of publications dealing with this phase of the subject are listed at the end of this bulletin. The objective here has been to describe the development of an actual one-variety community from a mixed-variety condition, enumerating the difficulties encountered and the way in which they were surmounted. Many of the advantages of one-variety production are of course mentioned, but they are the ones incidental to the problems encountered and are discussed primarily from the standpoint of actual improvements effected.

It might seem from the foregoing pages that the production and distribution of planting seed has had undue prominence. The production of superior planting seed, however, is a necessary condition to the production of superior fiber, and the fact that the Coachella Valley Acala community did provide good Acala planting seed for other districts made the benefits of the community organization available to a much wider area. Such an undertaking on the part of a community also provides material for a discussion of the precaution necessary for the production of pure planting seed. As a matter of fact, the returns to the Coachella Valley Acala community from the increased value of their fiber far exceeded the added value of the seed.

In conclusion, features are briefly mentioned which were found by the experience in the Coachella Valley to be of material assistance in establishing a one-variety community.

1. The establishment of a one-variety community will be much easier if a good variety is chosen, since its superiority over the poorer varieties can be demonstrated. For instance, the Acala variety gave exceptionally good results in the Coachella Valley from the first, and for this reason many of the growers were anxious to procure seed. The best variety can sometimes be demonstrated by community variety tests, and such data will be of influence with some growers.

2. However, if the community is to depend on an outside source for its seed supply, it is important to choose only a variety of which

an adequate supply of pure seed is available. To bring more mixed seed into the community might not improve the crop, or might even impair it.

3. Leaving out of consideration special cottons such as Egyptian, the yield per acre is of primary importance, but the adoption of a variety which brings a premium on the market will provide an additional advantage to the community. It was evident in establishing the Coachella Valley community that the choice of a superior variety such as Acala, which yields exceptionally well, has good-sized bolls, a good lint percentage, and extra-value fiber, will aid very materially in establishing one-variety communities.

4. After the variety has been selected, it is of great advantage to be able to make the best seed of this variety available to the entire community at cost. Where the community seed supply has to be procured from outside sources this may not be possible, but if the seed is produced within the community it is perfectly feasible. If ability to develop the seed supply is not available within the community, a quantity of seed sufficient to plant fields corresponding with the rogued acreage of the Coachella Valley can be obtained from reputable sources outside of the community and seed from these fields made available to the community at cost. If the community includes a large area, it may be necessary to increase the seed for two years before it is furnished to the community at cost. When the seed supply is produced within the community, it is necessary to protect it from mixture at the gin.

5. Making the best planting seed available to the community at cost not only hastens the establishment of a one-variety community but has the added advantage of making it likely that every grower in the community will plant equally good seed of this variety. Such action would carry the community organization an important step onward and would improve still further the quality and value of the cotton produced. In the Coachella Valley in 1925 this policy resulted in the entire community planting seed of the third-year increase from a single row.

6. The formation within the community of an association for the production of one variety is also a material aid. The members should agree to grow the kind of cotton specified by the association for a period of five years, which will give stability to the community effort. The association can also take care of the seed distribution, aid in selling the fiber, and handle other problems that are sure to come up. It was also demonstrated in the Coachella Valley that a local association aids materially in making commercial quantities of pure seed regularly available to other districts. The association should consist of bona fide growers, and all growers in the community should be eligible for membership, otherwise the usefulness of the organization will be restricted and perhaps destroyed.

7. In the final stages of the establishment of one variety in the community the gins can be of great assistance by refusing to gin cotton of other varieties. This should not be attempted, however, before the community is practically unanimous in the choice of the variety.

8. The legal protection of one-variety communities by a county ordinance or by State legislation is also desirable. Such regulations, however, should apply only to communities already established on

a one-variety basis and should not be invoked to coerce mixed-variety communities into one-variety production.

That it is possible for entire communities to unite in the production of one variety of cotton has been amply demonstrated by the establishment of one-variety Acala communities in California. That the establishment of such communities is worth while has also been demonstrated by the benefits received. That the establishment of such communities is of great benefit to other cotton-growing districts is evident from the extension of the Acala variety through the seed made available by the Coachella Valley Acala community. Of the 483,000 acres of cotton grown in 1925, in California, Arizona, and the Imperial Valley, Lower California, Mexico, 322,100 acres were of the Acala variety. The Acala seed used in planting this entire acreage, with the exception of the San Joaquin Valley of California, originated from seed distributed by the association representing the Coachella Valley Acala community during the period 1921 to 1925.

## LIST OF PUBLICATIONS ON COMMUNITY COTTON IMPROVEMENT

The following list includes publications issued by the Department of Agriculture and a few other papers that treat of the improvement of the cotton industry through community organization, in order to utilize superior varieties and maintain pure seed supplies.

Cotton Selection on the Farm by the Characters of the Stalks, Leaves, and Bolls. By O. F. Cook. Bur. Plant Ind. Circ. 66. 1910.

Cotton Improvement on a Community Basis. By O. F. Cook. Yearbook of the U. S. Dept. of Agriculture for 1911, pp. 397–410. (See also Report of the Chief of the Bur. Plant Ind. for 1911, p. 24.)

Selection of Cotton and Corn Seed on Southern Farms. By S. A. Knapp and J. A. Evans. Bur. Plant Ind. Doc. 747. (Farmers' Cooperative Demonstration Work A–67.) 1912.

Factors Affecting the Production of Long-Staple Cotton. By O. F. Cook, Bur. Plant Ind. Circ. 123, pp. 3–9. 1913.

Cotton Problems in Louisiana. By O. F. Cook. Bur. Plant Ind. Circ. 130, pp. 3–14. 1913.

The Relation of Cotton Buying to Cotton Growing. By O. F. Cook. U. S. Dept. Agr. Bul. 60. 1914.

Custom Ginning as a Factor in Cotton-Seed Deterioration. By D. A. Saunders and P. V. Cardon. U. S. Dept. Agr. Bul. 288. 1915.

Community Production of Durango Cotton in the Imperial Valley. By Argyle McLachlan. U. S. Dept. Agr. Bul. 324. 1915.

Community Production of Egyptian Cotton in the United States. By C. S. Scofield, T. H. Kearney, C. J. Brand, O. F. Cook, and W. T. Swingle. U. S. Dept. Agr. Bul. 332. 1916.

Tests of Pima Egyptian Cotton in the Salt River Valley, Arizona. By T. H. Kearney. U. S. Dept. Agr., A. & D. R. P. Circ. 1. 1916.

Extension of Cotton Production in California. By O. F. Cook. U. S. Dept. Agr. Bul. 533. 1917.

Production of American Egyptian Cotton. By C. S. Scofield, T. H. Kearney, C. J. Brand, O. F. Cook, and W. T. Swingle. U. S. Dept. Agr. Bul. 742. 1919.

Cotton Improvement under Weevil Conditions. By O. F. Cook. U. S. Dept. Agr., Farmers' Bul. 501 (revised). 1924.

Cotton a Community Crop. By O. F. Cook. Jour. Heredity, vol. 11, pp. 174–177. April, 1920.

Commercial Parasitism in the Cotton Industry. By O. F. Cook. Nature (London), vol. 105, pp. 548–549. July 1, 1920.

Community Cotton Improvement in North Carolina. By R. Y. Winters, S. W. Hill and P. H. Kime. N. C. Agr. Ext. Ser. Circ. 108. 1920.

Your Community's Cotton Reputation. How Some Communities Are Building Good Cotton Names and Capitalizing Them. By F. H. Jeter. The Progressive Farmer, vol. 36, p. 130. Jan. 29, 1921.

The Cotton Variety Problem. By J. S. Cates. The Country Gentleman, vol. 86 (10), pp. 9, 34. Mar. 5, 1921.

Adelanto en el Cultivo del Algodón. By O. F. Cook. Boletín de la Unión Panamericana, vol. 52, pp. 273–294. March, 1921.

City and Country. By O. F. Cook. Jour. Heredity, vol. 12, pp. 110–116, 167–173. March and April, 1921.

Improvements in Cotton Production. By O. F. Cook. U. S. Dept. Agr. Circ. 200. 1921.

Cottonseed Mixing Increased by Modern Gin Equipment. By W. W. Ballard and C. B. Doyle. U. S. Dept. Agr. Circ. 205. 1922.

One-Variety Cotton Communities. By O. F. Cook. U. S. Dept. Agr. Bul. 1111. 1922.

Community Cotton Production. By O. F. Cook and R. D. Martin. U. S. Dept. Agr., Farmers' Bul. 1384. 1924.

Production of Acala Cotton in the San Joaquin Valley of California. By Wofford B. Camp. U. S. Dept. Agr. Circ. 357. 1925.

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March 10, 1927

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